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LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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CONCERNING THIS ISSUE.

AFTER the disorganization in which the country found itself on May 3 and for nearly a fortnight, including the withdrawal from work of all employed in the printing trade, we have endeavoured in this number, by dropping the issue for May 12, to gather together the threads of our work, and to get promptly to normal state. In the circumstances, subscribers will, we are sure, accept this "JOURNAL" as the equivalent of two weeks' issues. When the collapse came, preparations for the printing of the number for May 5 were well advanced. It has been completed, and was posted earlier this week to all subscribers.

EDITORIAL NOTES.

The Great Folly.

THE general strike ended last Wednesday morning, by its unconditional withdrawal by the General Council of the Trade Union Congress. But the miners are obdurate; and the trouble in the coal industry is not settled, though matters, as we are going to press, appear to be distinctly brighter. The Council of the Trade Union Congress were wise in bringing to a close a position into which folly, and not wisdom, had led them. By means of an unscrupulous, unpatriotic, unconstitutional, and illegal action, they believed they could make the nation and its elected Government bow to their will; and all the palliative talk by members of that Council, and all the defensive excuses which they make, will not, in the eyes of the community, condone the offence, the dishonourable breaking of working contracts, and the callous disregard of effects. To have surrendered to this would have shown weakness, and would have belittled both Government and nation.

There were no doubt several subterranean or unadmitted reasons for the calling-off of the general strike. One influence, we should imagine, was the illegal position in which the Council of the "T.U.C." had placed themselves and the men who had acted on their instructions. The first awakening as to this came when Sir John Simon told the House of Commons that the leaders of the Unions who were responsible for the strike, and the men who had broken their contracts of service with their employers, were subject to actions for damages for any loss that had been incurred. But probably a greater reason was the pronouncement of Mr. Justice Astbury, in the Chancery Division, on Tuesday. His Lordship had before him a motion by the National Sailors' and Firemen's Union for an injunction against secretaries and other officials of certain branches of the Union to restrain them calling on their members to strike, or to leave their employment without the authority of the Executive Council, and contrary to the rules of the Union. In the course of his decision, his Lordship said:

> The so-called general strike called by the T.U.C. Committee is illegal, and contrary to law; and those persons inciting or taking part in it are not protected by the Trades Disputes Act of 1906. No trade dispute has been alleged or shown to exist in any of the unions affected, except in the miners' case; and no trade dispute does, or can, exist between the Trades Union Congress, on the one hand, and the Government and the nation, on the other. The orders of the Trades Union Council are, therefore, unlawful; and the defendants are at law acting illegally in obeying them, and can be restrained by their own union from doing so.
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> Trade union funds in this country are held in a fiduciary capacity, and cannot legally be used for, or depleted by, paying strike pay to any member who illegally ceases to work, and breaks his contract without justification, in pursuance of orders which are unlawful; and this fact also is one that the plaintiff union is entitled and bound to make clear to its members in the difficult position in which they have been placed.

That is clear; and the defendants admitted that it was so. In short, the leaders of the Trade Unions concerned, and all their members, other than the Miners' Unions, have acted contrary to the law. The members of the Unions are not compelled to break the law at the command of their leaders; and, if they do so, they are not immune from the consequences. Regarding the illegal breaking of contracts, agreements, or conditions of service without giving proper notice—seeing that the Unions whose members were ordered out were not involved in a dispute within the terms of the Trades Disputes Act—the question has been asked what the men would have said had their employers turned them out of their employment without legal notice, or without pay in lieu of notice. There is no response, but merely a gloomy silence. Had such a thing happened, there would have been a tremendous outburst of feeling from the side of the men; and the employers would have been called to account for their action. Having broken their contracts of service, and occasioned no end of waste and damage—the "JOURNAL" itself suffered damage by its belated issue for May 5, and the loss of the issue which should have been dated May 12—and helped to create more unemployment, the men who were called out by the General Council of the "T.U.C." sought in most cases to return unconditionally. Justice and legality must be comprehensive of all, and not one-sided, as some trade unionists apparently seem to think they should be.

Another very good reason for the capitulation is, no doubt, to be found in the fact that, had a strike of such dimensions had long duration, there would not have been a copper left in the coffers of the Unions; and the workers in other countries were not inclined to assist with finances. A fourth—and a large reason—was that the leaders saw the firmness of the Government was backed by a nation solid (except one section) for the defence of the country's interests; they saw their subversive plans coming to naught, and that the quicker they recognized it, the safer they would be. The feelings of the men can be well understood now that they have learned they have been misled by "leaders" who, unfortunately, have turned the trade unions into political machines, and have made their old and legitimate functions and excellent service for the workers the secondary, and not the primary, purpose of their existence. We hope as the result of the recent deplorable experiences that the rank-and-file of the Unions will see to it that they are henceforth limited to their proper objects, and not for the purpose of indulg-

ing in the folly of a trial of strength against the whole nation. A further indication of narrow vision is found in this: The Council of the "T.U.C." created a great disorganization of work in the country, and then expected the full volume of employment to be found immediately on the calling-off of the strike. It simply could not be done.

It is clear from the events of the past fortnight or more that what the trade unions require is men of clear vision as leaders, who can balance methods against the probable consequences. Until there is a new mentality in the trade union world, certain it is that the one way—co-operation—to a greater prosperity of the country and enlarged employment will never be achieved. It is for the rank and file of the unions to ponder over these things, and to act according to the dictates of their own intelligence. The difficulties in the mining industry have still to be composed; and yet the country, its industries, and its workers are the poorer, and will be for long to come, through the terrible waste occasioned by the impolitic and senseless action of the "T.U.C." There are things which take long to forget and to readjust. This is one of them.

Later.

In the early part of the foregoing, reasons are suggested for the sudden capitulation on the part of those who ordered the general strike. At the time it was written, there was within knowledge another reason why the dramatic move was made; and now, after the events of last Friday, which became common news on Saturday, there may be reference to it. It was this: While the leaders were talking of the solidarity which had been displayed by the members (apart from the miners) of the unions involved, while the so-called workers' papers were misrepresenting the situation by stating that this and that were not happening, although occurring before the very eyes of the trade unionists, the leaders were aware that there was a sullen resentment on the part of a large section of the workers in every union at being called from their employment, in which they were working happily and contentedly, to take part in something which was no immediate concern of theirs. The first resentment and inaction of the members of some of the unions, excepting a minority of hooligans who (or their like) can be found in every walk of life, was not long in becoming a force which the leaders dared not ignore. Had the strike not been called-off when it was, they would have had the mortification, despite their appeals, of seeing large bodies of men return to their work, and the unions themselves would have stood a good chance of being overthrown in the debacle which would have taken place. Even now they are likely to suffer enormously in membership, for there are many of their members who resent being led by Communists, who are opposed to trade unions being made political machines for serving the aspirations and ambitions of such men, and who object to their organizations being utilized for offensive action against the Government and the nation. Many of the members of the unions, too, have been heard to denounce their leaders for having called them from their occupations and pay to idle about for the pittance the first week or two the unions could afford to pay, until funds were depleted; and those who will not now be able to obtain immediate employment through this assault on the nation and industry and trade will be very sore against those who have brought them to this pass. The general strike has been a salutary lesson to the leaders. The great railway unions have signed terms of settlement which state: "The trade unions admit that in calling a strike they committed a wrongful act against the companies, and agree that the companies do not by reinstatement surrender their legal rights to claim damages arising out of the strike from strikers and others responsible." The first point in the tramway agreement is: "The strike was a wrongful act." The railway agreement is a document full of self-accusation and regret, capped by a promise that the same thing shall not occur again.

A great mischief has been done. Out of it all we hope there will arise a better spirit of co-operation for making this country of ours a place of increasing prosperity and contentment, and not one in which there is an almost unceasing strife.

A Review and Some Lessons.

The action of the General Council of the "T.U.C." temporarily threw into disorder vital parts of the nation's system, interrupted certain industries, intensified unemployment, and even aimed at suppression of the Press and the circulation of intelligence as to what was happening. Though the leaders attempted all this, there was one thing they could not suppress, and that was the spirit of the people. On the opening and following days of the stoppage of railways, transport, and newspapers, the whole nation faced the situation with such good nature and resolve to do the best possible, that there was rapid success; but the incessant tramp of old and young on the morning and evening of Tuesday, May 4, as they proceeded to and from their daily toil, must have brought a sense of shame to many who were participating, in obedience to Union orders, in this act of disloyalty to the country. But locomotion and transport speedily improved. While the General Council of the T.U.C. were utilizing their disruptive forces in various directions against the country, the people were consolidating their power in other directions with fine counteractive effect. It was a good sight to see this evidence of self-help and reliance, and a mutual desire to assist the other. There was a fraternal spirit abroad, which made every individual (apart from the strikers) endeavour to do a part in ameliorating the conditions, and in counteracting the peril which had been brought about by the command of the labour leaders.

There is one thing the leaders connected with all forms of transport forgot. It is that the transport of the country does not to-day rely solely upon joint-stock enterprise and union members; but private ownership of mechanically propelled conveyances, with a capable driver in nearly every other man one meets, has transformed into something huge, and yearly becoming increasingly effective, an alternative working force to any stoppage of the customary means of transport. It was a splendid spectacle to witness, from the suburbs and places distant from London, the constant stream of privately owned cars and other vehicles conveying the people to work who usually travel by train. It was very largely a mere transfer from the railroad to the public road of the means of locomotion; and the good fellowship which prevailed was an abundant testimony to a unity of purpose in defeating the unpardonable attack which had been made upon the nation. And quickly, too, the "skeleton" services which were begun by the railway companies gathered strength; and, as they did so, the density of the traffic on the roads diminished. Omnibuses, too, soon made appearance on the streets under protection. Thanks are due to the army of volunteers who in the emergency offered their services to maintain law and order and to carry on the work of the country, when other men—numbers unwillingly so—idled at the behest of those who were doing their best to cripple their and our country. It will not readily be forgotten that it was largely due to the volunteers that the nation—including the strikers and their families—were fed during the great emergency. From what they saw, the Government knew, as they had anticipated, that they had with them all that great majority of the nation not dominated by the trades unions involved in the general strike. The growth of technical education has also provided the country with more men who can quickly adapt themselves to a craft, and take the place of men who are more skilled only through long experience, and not through membership of a union. We have had a magnificent demonstration of the nation's adaptability, when sections refused to follow their ordinary vocations. We believe that, as a result of this strike, there will be a considerable revolt in the membership of the trade unions against this exercise of despotic power by a central body of trade unions. Many members of those unions, we know, can see nothing democratic or patriotic in the quixotic act of using that power against a democratic Government. They are simply wondering what next they will be called upon to do; what next they will have to support, or what sacrifices they will have to make; or when they will be free from this sort of thing through giving up a large part of their union autonomy within their own industry. It has been a fine opportunity for the unemployed, who have been doing badly through those very influences which brought

about the miners' dispute, and who have had their ranks largely increased by the action of the "T.U.C."

There is another lesson from this general strike, which bears upon the Government Electricity Bill and scheme for the country. It is that the country's railway electrical services must be kept distinctly apart from any general scheme of electricity supply, so that it does not add to the industrial and militant power of those men who have, as labour leaders, forfeited the confidence of the nation through the assault made upon its vital services. The way the power engineers stuck to their work, the way young but competent electrical engineers gave their assistance to the railway companies and the public in working lines that were electrified, did much to mitigate the conditions which the heinous onslaught on the people of the country threatened to bring about. So far as we have been informed, good supplies of gas have been maintained; but, of course, the industry has suffered interruption in trading through the closing down of factories and reduced work and trading. There has only been here and there a partial interference with work at central electricity stations. But even where that happened, it was not continuous—through the excellent efforts of loyal employees and voluntary help.

Coal Stoppage and Government Proposals.

CONSIDERATION of the mining industry's difficulties was resumed in the midst of a great disorganization. The position is much worse for the Miners' Federation than before the trade union chiefs, at the request of the Federation, took the matter in hand, and pursued the most disastrous course they could have done for the workers of the country. They do not appear to have been very clear in their minds how the stoppage of the nation's work was going to help the miners. A costly experiment has made plain to them facts which their obtuse minds had failed to grasp. The miners' position has been considerably injured by what has happened. There will be a greatly reduced demand for coal from the home industries for long to come; and other countries—from which the miners expected so much support and did not get it—have been busy, and are still busy, appropriating our markets overseas. There cannot now fail to be more unemployment in the mining areas than there was before the stoppage and the general strike; and this will also be the case in other industries. It was a great pity the men who call themselves "leaders of labour" could not before May 1 see a little beyond their noses. In the most effective way possible, they have injured the workers throughout the country. Those who take deliberate and revolutionary steps to degrade the economic position of the country cannot escape the bad results of their own action. The leaders realize this to-day; and they realize, too, that they have given the nation the opportunity of showing them that the elected representatives of a democratic country are to govern, and not the men at the head of the trade union affairs. This penetration of light into the minds of these leaders is evident in certain of the strike settlements. After the termination of the general strike, the Prime Minister lost no time in getting into contact once more with the mining interests—including the Miners' Federation; and although there was the usual tall talk from certain of the more loquacious of the leaders as to what they would or would not agree to, reports from various mining areas show that the men are generally peacefully inclined, and are tired of idling about while markets for their products are being filled by the miners abroad, from whom they had been promised much, but obtained nothing, while rewarding the miners of those other countries by placing in their hands an advantage which they required more than the British miners for the improvement of their own positions. The best thing the British miners can do now is to lend, for the rest of their days, Mr. Cook and a few other of their extremist leaders to the miners of those continental countries who have been bagging our foreign coal trade.

However, it is clear that there is no hope of arriving at a settlement by leaving the coal owners and the miners to discuss matters; and therefore the Prime Minister has adressed to the Miners' Federation proposals which, in the opinion of the Government, should provide a reasonable basis for the adjustment of the dispute in the industry on the lines of the Coal Commissioners' report. We have reproduced the text of the proposals in later columns, seeing that the document will become an historic one, and, we hope, the turning-point to peace from constant uncertainty, disagreement, and interruption—which conditions, we are confident, are not consistent with the views of the majority of the men in the industry, any more than they are of the majority of the workers in other industries. As a large coal consumer, the gas industry will be pleased to have more confidence in the stability of its coal supplies, the want of which has been partly responsible for its service to the community not being all that the industry desires. One thing which will be especially marked is that, among the many items in the Government scheme, is the intention to set up a National Fuel and Power Council, as proposed by the Coal Commission. That is a matter which the National Gas Council have well under consideration; and if such a Council is created, the gas industry—as an important customer of the coal industry, and as the supplier of the cheapest labour-saving heating agent—must have representation and voice in the work of that body. In fact, the Coal Commissioners made a point of such co-operation.

The Coal Industry's Reformation.

WHATEVER may be the final issue of the great upheaval that has been taking place in the country, it is perfectly safe to say there can be no miraculous change in the economic conditions of the coal industry. The metamorphosis must come gradually, and it should be largely by the joint effort of those within the industry. The economic conditions of the dead past, when coal revelled in prosperity, cannot return, for time and progress have produced changes in them which, so far as can be seen, will only alter in the direction of accentuation. What has happened in the British coal industry is that, while those changes have been getting it into their grip, there has not been sufficient vision exercised to produce internal conditions of a countervailing order. Because of this, there is a great necessity for constructive ideas from competent men, and for co-operation for betterment by all engaged within the industry. In the address which Sir Arthur Duckham delivered to the Manchester Section of the Society of Chemical Industry, and which we recently published, he offered several constructive suggestions, which will be valuable at any time, although there are points in the deliverance upon which there cannot fail to be a division of opinion, and acute division in respect of those places where Sir Arthur allows his buoyant optimism to make suggestions which attack individual interests. There is a proneness to look at matters from the standpoint of one's own interests; but there is no quarter in our system of affairs which has a greater fundamental importance to the country than coal, and therefore makes claim to consideration from the collective rather than the individualistic standpoint. Sir Arthur urges that it is not by destructive or prejudiced criticism, but by helpful suggestions and the promotion of goodwill, that advance can be made. We are inclined to think that destructive criticism is often necessary to the paving of the way to, and the promotion of, constructive ideas; and a little thought will probably convince others that it is so, whether applied to the affairs of the coal, gas, electricity, or other industries.

But let that pass. We regret the valuable address did not have greater publicity in the daily Press before the trouble in the coal industry reached the anxious days which preceded the strike. The public would have had the salient facts before them in a nutshell; and there are suggestions in the address which might have had some weight with the negotiators, who know Sir Arthur so well. Notwithstanding that the miners have been taking two-thirds of the selling price of coal for their labour, notwithstanding that production per man-year has been reduced by 50 tons, notwithstanding that the men are working only seven hours a day, and notwithstanding, too, that the industry is greatly over-manned, Sir Arthur would not have the men's wages reduced. The Coal Commission suggested that there should be wage revision as the part the miners should—at any rate temporarily—take in co-operating to bring about a better state of things. But in the negotiations the miners' representatives all along refused to con-

sider any reduction of wages or any extension of hours to promote improved production and better economic circumstances. The address spoke of co-operation; but, while we know this is the right course, there is little good talking of it when the Miners' Federation refuse to allow the men to co-operate. The suggestion Sir Arthur makes as to increasing production by prolonging the shifts by half-an-hour would not be entertained. His idea as to pit committees is excellent, if adopted, and should contribute to increase the amount of coal raised per man-shift. But would they bring about the proposed extension of piece-work rates, when the trade unions hate the idea of countenancing any condition which would encourage men to "put their backs" into their jobs, owing to that false and pernicious doctrine of labour that that is the most ineffective way of providing work for a greater number? The science of economics, and knowledge of work-producing laws, are not strong features in union circles. Such excellent suggestions as are found in this regard in the address must be fugitive in their effect, for the simple reason that the trade union leaders have not been converted from their false doctrines, and so do not see the error of their policy and ways. That is why the Miners' Federation stuck so tenaciously to their three demands, because they could not, or would not, appreciate that they should be considered in relation to the constructive parts of the Coal Commission report, which was so largely founded upon the principle of co-operation in reconstruction.

Thus we are left to consider—more the pity—what can be done without the help of the miners to produce reorganization and development of the coal industry, which is a condition that all coal users wish, including the miners, although they do not display any great enthusiasm for participating in bringing it about, while hoping to share well in the proceeds of any future betterment. Without going into details (for which reference must be made to the address, *ante* p. 209), Sir Arthur advocates a National Board of the Coal Industry, in which connection he presents a suggestion which might, if thought of earlier, have made district minimum percentages look more inviting to the Miners' Federation. It is that while district agreements should be allowed, they should before coming into force be submitted to the Board (which would consist of equal representation of owners and men). In this way district agreements would be subject to national ratification or rejection. The closing of unremunerative pits is also put forward as essential; as well as the grouping of pits for economical working, one issue of which would be to facilitate a better cleansing of the coal at a central station away from the pits. He looks with favour upon the grid-iron electrification of the country, and suggests that what is good for electricity is good for gas. If this comes about, he favours the development of low-temperature carbonization plant for dealing with the smalls and slacks at the collieries, and the production of both gas and electricity. All surplus gas and electrical energy could be fed into the bus cables or mains for use in surrounding areas. Electricity is now generated by collieries, with comparatively small plants, for their own use at a cost of 0·25d. per KW.-H.; and he believes the gas could be delivered into the mains at 6d. to 8d. per 1000 c.ft. Does Sir Arthur mean low-temperature purified gas of (say) 600 B.Th.U., and purified? If so, by all means let us have gas at 1d. to 1·33d. per therm. But, of course, the supply would have a limit—electricity, for example, by the facilities for the provision of condensing water where steam power is used. Sir Arthur suggests that each group of pits could well feed into the country's cables 20,000 KW., and produce 6 million c.ft. of gas per 24 hours. It is the absence of distribution facilities which prevents this being done. Low-temperature coke could also be disposed of at good prices for domestic purposes. By the aggregate of these means, a low-priced material from the coking-coal pits could be utilized to great advantage. The gas industry does not, of course, want to be greedy; but it is hoping to obtain a part of that 38 million tons or so of raw coal which now goes to the domestic grate, and to supply in its place a good quantity of smokeless solid fuel in excess of the present coke business. We see no reason why, gas undertakings being distributors of fuel (gaseous and solid), they should not also extend their powers to the purchase of smokeless fuel for retail purposes from collieries, if their own output is not equal to the demand. Even the chemical manufacturers could not object to this. One important objection to too much centralization at the pit head is that it would put more power into the hands of militant labour, as experience of a general strike so well demonstrates.

A point upon which there will be a distinct reluctance on the part of large users of coal to side with Sir Arthur, is his suggestion that a rise in price by 2s. a ton would not retard a return to the normal prosperous conditions of the country. Steel manufacturers have asserted that such a figure on the ton of coal has frequently stood between them and their ability to secure, in competition with manufacturers in other countries, contracts for this one. The stability of the coal industry admittedly is highly important; the stability of the aggregate of the industries in the country is nationally still more important. There can be no determination as to what a 2s. per ton rise in the price of coal would do, without considering the whole effect of such a step, and not merely its effect upon the coal industry. The Government declare the country wants cheap power; the gas industry says it requires cheap heat and power; the coal industry says it cannot compete, even at pre-strike prices, in some of the overseas markets which used to be ours. Hence the drop in our coal exports. The way to obtain the desiderata of cheap heat and power, and the recovery of our coal business abroad, is not by raising the price of coal. But this point excepted, and with slight qualification of others, we must all agree that the address upon which this comment is based is a valuable contribution to a subject vital to our national well-being.

[The foregoing was written before the end of the general strike.]

Coal Strike Regulations.

Although the general strike has come to an end, the regulations regarding the rationing of coal, the supply of gas and electricity, and the use of illuminated signs will be continued until the mining dispute has been settled.

Postponed Meetings.

Unfortunately and unavoidably, several meetings, certain Association visits, and other engagements have had to be postponed through the lamentable events of this month. The coal strike is still with us; and gas engineers have temporarily plenty to occupy their attention. When there is release from difficulties, we hope the Committees responsible for the fixtures will do their best to see that the events do not come upon their members *en masse*, but are spread over a period, so as to get the best possible attendances. In making arrangements, it will be well to remember that the second week in June is booked for the Institution meeting. The new date for the North of England Association meeting is Friday, May 28, and for the Southern Excursion to Bristol Friday, June 18.

"Free" Maintenance and the Sliding-Scale.

Before finally determining the "charges" part of their new programme for legislative powers for the gas industry, we suggest that the National Gas Council should consider whether, in cases where sliding-scale companies adopt so-called "free" maintenance, and the cost falls upon the price of gas, the ascertained amount of the cost per therm sold should be deducted from the price ruling in calculating the dividend payable—*e.g.*, supposing the price is 8·25d. per therm, the cost of free maintenance 0·25d. or 0·5d., then the price of gas for dividend purposes should be 8d. or 7·75d. as the case may be.

Coke Distribution in the United States.

During the last year or two, there has been considerable interest in the question of coke produced in coke-ovens being placed on the domestic market in competition with gas-works coke. It is observed from some data published in the "Iron and Coal Trades Review" that a not negligible proportion of coke from the coke-ovens of the United States is sold for domestic use. A reference to this may be accompanied by a few particulars as to the position of the coking industry in the States at the end of 1924. There were then in existence 71,845 coke-

ovens, of which 11,413 were of the bye-product type, and 60,432 of the beehive type. The total coal charged into the ovens was 64,975,649 tons, from which was produced 44,269,605 tons of coke, which represent a yield of coke from the coal of 68·1 p.ct. Of these total figures, the coal used amounted, in the bye-product ovens, to 49,061,339 tons; the coke produced being 33,983,568 tons. Into the beehive oven, 15,914,310 tons of coal were charged, producing 10,286,037 tons of coke. The yield of coke from the bye-product ovens averaged 69·3 p.ct. of the coal used, and from the beehive ovens 64·6 p.ct. It should be mentioned that net tons (2000 lbs.) are used in these statistics. Of course, most of the coke was sold for furnace, foundry, and other industrial purposes; but of the bye-product coke 2,812,771 tons were sold for domestic use, and of the beehive coke 139,886 tons—together 2,952,657 tons.

Company Promotion Changes.

Some correspondence has been seen by us relating to the Southern Counties Electric Light and Power Supply, Ltd., which is one of the productions of the promoting coterie at 43, Cannon Street, now with an office at 121, Cheapside. This remarkable Company, it will be remembered, boasted of offices in London, Brighton, Eastbourne, Bournemouth, and Exeter. It is observed that the Brighton address at the head of the paper—in Church Road, Hove—is now stamped out. The Bournemouth address has met a similar fate, though the telephone numbers remain. The names of Walter H. Mann and Alexander Martin have been removed from the Board of Directors. We wonder whether by their own request. The names substituted in typewriting are E. B. Calvert and E. F. Hill. Sir Charles B. H. Soame, Bart., and Major James Brigden, A.M.Inst.C.E., are the other two Directors. The correspondence is signed by "James Brigden, Major, A.M.Inst.C.E." Why is it necessary to parade the "Major" and the "A.M. Inst.C.E.?" They do not impress us. A circular letter has lately been posted to gas shareholders from the Heathfield and Waldron Gas Light and Coke Company, Ltd., of which Calvert, Brigden, and Hill are the Directors. The "local administration offices" are at 151A, Terminus Road, Eastbourne—one of the addresses of the Southern Counties Electric Light and Power Supply Company. The letter states that the Company have some of the ordinary share capital for disposal. The price of the £10 p.ct. shares is £1 5s. each, and of £7 p.ct. shares par (£1 each). It is also stated that "the Company's business is steadily progressing; and it is considered possible that the Company may at some future date be taken over, and, in such event, a substantial premium might be obtained. The district served by the Company's works is increasing considerably." Our readers are not likely to be trapped in this way.

Coal Exports.

The returns as to coal exports for the first quarter of the year have been issued. Taking first the figures for March, it is found that there was a slight improvement on the shipments for February. The total coal exported amounted to 4,702,536 tons, of a value of £4,184,079. In the same month of 1925, the quantity was 4,392,258 tons; and in that of 1924, 5,190,265 tons—the respective values being £4,557,002 and £6,390,574. Of the total coal shipped, a larger quantity of the gas variety went to other countries than in February; the amount being 642,034 tons, of a value of £526,238, which averages 16s. 4·71d. per ton, as compared with 16s. 1·5d. in February. In March, 1925, the export of gas coal was 600,104 tons, valued at £603,672. In March, 1924, the quantity was 687,358 tons, valued at £832,423. Taking the figures for the quarter, the tonnage has a marked similarity to that of the first three months of 1925, but values have been much lower. In the three months, the total amount of coal sent abroad was 13,190,584 tons (value £12,031,042); 1925, 13,102,317 tons (value £13,803,726); 1924, 15,705,950 tons (value £19,270,422). The gas coal shipped during the quarter amounted to 1,747,963 tons, of a value of £1,424,382. In the first three months of 1925, the quantity was 1,720,846 tons, valued at £1,760,802; and in that of 1924, 1,981,846 tons, valued at £2,401,794.

Shipments of Gas Coke.

The business in gas coke showed a falling-off in March, compared with February; but this was to be expected. For the month, however, the figure can claim to be an improvement, as compared with the same month of the two previous years. The quantity sold abroad last month was 78,965 tons, of a value of £81,247, which averages £1 0s. 8d. per ton, as compared with £1 1s. 1·9d. for February. The sales abroad in March, 1925, amounted to 52,658 tons, of a value of £76,400; and in March, 1924, 76,826 tons, of a value of £136,708. In the three months 336,611 tons have been shipped, of a value of £347,963. In the corresponding period of 1925, the shipments were 158,178 tons, of a value of £240,085; and in that of 1924, 326,455 tons, of a value of £569,361.

Tar Products.

In March, 20,734 gallons of benzole and toluole were exported, compared with 53,041 gallons in the same month of last year. During the three months, we have sold abroad 396,826 gallons, as compared with 115,521 gallons in the corresponding period of 1925. Comparatively little business is still being done in naphtha; the amount exported last month being 7562 gallons, compared with 3463 gallons in March, 1925. In the quarter, 41,609 gallons were shipped, compared with 10,895 gallons in the corresponding period of 1925. There has been an improvement in the aggregate quantity of tar, oil, creosote, &c., sent overseas—the amount last month being 5,132,566 gallons, compared with 3,063,280 gallons in March, 1925. In the quarter 13,604,660 gallons were shipped, compared with 10,828,946 gallons in the same period of 1925.

Sulphate of Ammonia Shipments.

In March, 23,405 tons of sulphate of ammonia were sold abroad, compared with 19,198 tons in March, 1925. During the three months, the total shipment was 66,489 tons, compared with 79,607 tons in the corresponding period of 1925, which is a very material falling-off. France has not been a buyer at all this year. During the quarter, Spain and the Canaries have only purchased about half the quantity they did in the same period of 1925. The Dutch East Indies, in taking during the three months 14,764 tons, have exceeded by about 300 tons the shipment to them in the three months of last year. Japan has been a healthier buyer during the quarter, with 15,929 tons, compared with 14,182 tons in the same period of last year.

Gas Oil Imports.

In March, the quantity of gas oil imported was 6,661,683 gallons, compared with 5,721,410 gallons in 1925. In the three months the quantity imported totalled 15,241,840 gallons, as compared with 16,250,811 gallons in the same three months of 1925.

Society of Engineers

On May 3 the Society held a meeting in the Science Museum, South Kensington, when Mr. H. W. Dickenson, M.I.Mech.E., who is in charge of the Engineering Division, read a short paper entitled "Landmarks in the History of Prime Movers." Having dealt briefly with the harnessing of wind and water, the author mentioned that Thomas Savery, the most prolific inventor of his day, in 1698 patented his "fire engine," in which he embodied two ideas. One was to condense steam in a vessel communicating with water, when the latter would rise and could be retained by a non-return valve; the other was to force up this water by the direct pressure of steam on its surface. In the year 1712 Thomas Newcomen succeeded in perfecting the "atmospheric" engine—the progenitor of the modern steam engine. The atmospheric engine held sway for half a century till James Watt, in 1763, had the inspiration of condensing the steam in a vessel separate from the cylinder. The engine was still a vacuum apparatus, however, till, in 1802, Richard Trevithick patented the high-pressure engine. In 1866 N. A. Otto introduced the compression gas engine, the culmination of the labours of inventors over a period of seventy years. This opened out a great field of activity not only in scheming different cycles of operation and regulation of the mixture of gas and oil, but also in the use of other fuels for combustion. The patents of Stuart, in 1890, and of Diesel, in 1892, were the starting points of further development. The coming of the gas engine, and its rapid development, seemed as if it would oust the steam engine. In fact, Sir Frederic Bramwell before the British Association in 1881 suggested that in a few years the steam engine would be a museum curiosity. However, this outlook was altered when the Hon. Sir Charles Parsons brought out the steam turbine. The author concluded his paper by remarking that the fact remains that the thermal efficiency of the heat engine is still less than 40 p.ct.

PERSONAL.

Mr. F. W. Cross, M.Inst.C.E., Engineer and General Manager of the Lea Bridge Gas Company, has lately completed thirty years of service with the Company. In October last, he was granted six months' leave of absence; and upon his return the Board of Directors have arranged that he shall retire from the post of Engineer, but retain the position and title of General Manager, whereby the Company and the executive staff will continue to obtain the benefit of his experience and judgment arising from such a long connection with the Company, during which the output of gas has grown from under 90 million c.ft. to over 900 millions. Mr. D. Cleave Cross, Assoc.M.Inst. C.E., who has occupied the position of Chief Assistant to his father, has been promoted to the position of Engineer and Works Manager. Mr. D. J. Winslow, who occupied the position of Assistant in the Outside Department, has been appointed District Superintendent; and Mr. W. T. Kenshole, the Junior Assistant, has been promoted to the position of Chief Assistant.

Mr. John J. Hurley, of the Gas-Works, Moorhouse Avenue, Christchurch, New Zealand, has been appointed a Justice of the Peace for New Zealand.

The Directors of the Wellington (Somerset) Gas Company have appointed Mr. Alfred Thomas, Manager of the Burnham-on-Sea Gas Company, to succeed his father, the late Mr. P. Thomas, as Manager of their works.

Mr. H. Hughes, who for the last 9½ years has been Manager of the Llanrwst Gas-Works, has been appointed to a similar post at Moreton Hampstead, South Devon.

The Blackburn Corporation Gas Committee have appointed Mr. J. D. Ashworth (Works Superintendent) to the position of Deputy Gas Engineer, under Mr. G. P. Mitchell.

We congratulate Maj. W. M. Carr, M.C., on his promotion to the rank of Lieut.-Col. and Commanding Royal Engineer on the Staff of the 55th West Lancashire Division of the Territorial Army. Lieut.-Col. Carr, who is Engineer, Manager, and Clerk to the Stretford Gas Board, was associated with this Division prior to, and throughout, the late war, when he served on the western front.

OBITUARY.

The following announcement appeared in "The Times" on May 3: On the 29th April, at Teddington, Ann Livesey, widow of William Livesey, of the Gas and Water Companies' Association, in her 74th year. Interment at Hammersmith Cemetery. Beloved.

The death took place at Newport, on Monday, May 10, of Mrs. Jane Canning, the widow of Alderman Thomas Canning, J.P., who, for over thirty years, was a member of the Newport Corporation. Mrs. Canning was the daughter of the late Walter Fiddes, M.Inst.C.E., who was for many years Engineer and Manager of the Bristol Gas Company. Three sons and two daughters survive her. Of the sons, Mr. J. H. Canning is Engineer and Manager of the Newport Gas Company, and Mr. T. F. Canning Engineer and Manager of the Southend Gas Company.

The death occurred, on May 11, at the age of 64, of Mr. George William Fligg, for nearly half-a-century in the service of the Dewsbury Corporation Gas Department, at the Savile Town Works, where he started as a lad on the initiation of the works. He became Deputy Manager in the 'nineties, and was appointed Manager in 1907, from which position he retired in May, 1924. His son, Mr. G. H. Fligg, is in the service of the Yeadon and Guiseley Gas Company.

NATIONAL GAS COUNCIL.

The eighth annual general meeting of the National Gas Council of Great Britain and Ireland will be held at the Hotel Cecil, Strand, W.C. 2, on Tuesday, June 1, at 3.15 p.m.

Agenda.

Minutes of the seventh annual meeting of the Council, dated the 26th of May, 1925, to be confirmed and signed.

To report list of members of the Central Executive Board appointed and nominated respectively by the District Executive Boards and Associated Bodies. (Rule VIII., section 1.)

Presentation of the annual report and statement of accounts by the President (Mr. D. Milne Watson), who will move their adoption.

Election of the following office-bearers for the ensuing year: President, Honorary Treasurer, Trustees (2), Honorary Secretary or Secretaries, and Auditor.

Institution of Public Lighting Engineers.—The Council of the Institution of Gas Engineers have appointed Mr. John Wilkinson, O.B.E., Engineer and Manager of the Corporation Gas Department, Nottingham (President-Elect of the Institution), and Mr. F. P. Tarratt, Engineer to the Newcastle-upon-Tyne and Gateshead Gas Company, as their representatives to the forthcoming conference.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

May 28.—North of England Gas Managers' Association.—Annual general meeting at Newcastle.

May 28.—Chemical Engineering Group of the Society of Chemical Industry.—Annual general meeting, Abbey House, Westminster, at 6 p.m.

June 1.—National Gas Council.—Annual general meeting at the Hotel Cecil, Strand, at 3.15 p.m.

June 3-4.—Iron and Steel Institute.—Annual meeting at the Institution of Civil Engineers.

June 8.—Federation of Gas Employers.—Meeting.

June 8.—National Gas Council.—Meeting.

June 18.—Southern Association of Gas Engineers and Managers.—Visit to Bristol.

July 19.—Institution of Chemical Engineers.—Annual meeting.

Sept. 9.—"B.C.G.A.," Midlands District Conference.—Smethwick.

Institution of Gas Engineers.

June 7.—Council.
June 8-10.—Annual Meeting.
June 11.—Visit to Hastings.

GAS METERS TAKE THEIR PART.

Hyde Park was made by the Government the great centre for the reception and distribution of food supplies during the general strike. Aiding and abetting them in this humane work,

while rebellious forces were doing their utmost to create chaos in the country, were a number of gas-meters, which were fitted up by the Office of Works in the Park to record the gas consumption in the various marquees. Our photograph shows an inspector reading one of the 80-light meters.

Laundry and Allied Trades Exhibition.—The International Laundry and Allied Trades Exhibition, which was due to be held at the Royal Agricultural Hall, Islington, from May 10 to 18, has been postponed to May 21 to 28 inclusive. It will be open the whole of Whit Monday.

Scottish Juniors and the Education Scheme.—As a result of frequent inquiries from students in isolated and outlying districts, asking where classes could be found to train and qualify them for the Institution of Gas Engineers' Examination, the Joint Councils of the Eastern and Western Districts of the Scottish Junior Gas Association approached the Scottish Advisory Committee, and the difficulties of obtaining suitable classes to bring students up to the required standard were fully gone into. While it is impossible to have such classes in each area, the Councils are assured that, provided sufficient numbers of students show their willingness to enrol, classes will be set-up at various centres in Scotland. The Councils are now invited to give the Advisory Committee a note of students who find such difficulty, and are assured that the Committee, in conjunction with the Scottish Board of Education, will endeavour to have these classes set-up next winter.

GAS REGULATION ACT, 1920.

NOTICE TO GAS EXAMINERS.

Issued by the Gas Referees, May 5, 1926.

Part VII. of the Coal (Emergency) Directions, 1926 (E.4), dated May 1, 1926, given by the Board of Trade under the Emergency Regulations, 1926, contains directions to gas undertakers that, with the object of effecting the greatest possible saving in the use of coal, water gas shall be substituted for coal gas to the fullest extent practicable, and that undertakers who by reason of following such directions are prevented from making a supply of gas of the prescribed quality to any consumer shall, to that extent, be deemed to have fulfilled their statutory or other obligations to make such supply. The directions also provide for reduction of the pressure of supply at certain times in certain circumstances.

The Gas Referees desire gas examiners, where practicable, to make the prescribed testings as usual, but every report of testings made during the period in which the Coal (Emergency) Directions are in force should be marked:

> "In connection with this Report, attention is directed to Part VII. of the Coal (Emergency) Directions (E.4) given by the Board of Trade on May 1, 1926."

GOVERNMENT PLAN FOR A MINING PEACE.

In view of his opinion, and that of the Cabinet, that there was no chance of the coal owners and the miners, left to their own devices, coming to an amicable settlement, Mr. Stanley Baldwin last Friday addressed to the Miners' Federation an outline of proposals which the Government consider should provide a reasonable basis for the settlement of the dispute in the coal-mining industry. They are as follows:

1. In accordance with the recommendations of the Royal Commission, all practicable means for improving the organization of the industry and increasing its efficiency shall be adopted.

2. The Government shall take the following immediate action:

(*a*) Introduce and endeavour to pass this session:

(i) A Bill to give effect to the proposals of the Commission regarding amalgamations;

(ii) A Bill to provide for a welfare levy on royalty owners, and to further the establishment of pithead baths;

(iii) A Bill to restrict recruitment in mines;

(iv) A Bill to set up for the Coal Mining Industry a National Wages Board on the lines of the Railway Wages Board.

(*b*) Set up the proposed National Fuel and Power Council, which will contain representatives of Labour.

(*c*) Set up the proposed Wagon Committee.

(*d*) Appoint a Committee to investigate the profit-sharing proposals of the Commission and family allowances.

(*e*) Appoint a Committee to examine the question of selling syndicates.

(*f*) Prepare a scheme for the establishment of pit committees.

(*g*) Prepare plans for the assistance of men displaced from pits.

(*h*) Set up a Committee on Housing in Colliery Districts.

3. COAL ADVISORY COMMITTEE.—Before any legislation is introduced, or Committee set up, or other definite step taken by the Government towards giving effect to any of the recommendations of the Commission, a full statement of the step proposed shall be laid before the Coal Advisory Committee of the Secretary for Mines. It shall also be the duty of the Advisory Committee to review from time to time the progress made giving effect to the recommendations of the Commission, and to make recommendations on the subject. In the event of any recommendations made by the Committee not being adopted by the Secretary for Mines, he shall lay them before Parliament, together with a statement of his reasons for not adopting them.

4. Apart from expenditure that may be necessary under 2 (*g*), the Government will provide further financial assistance to the industry to the amount of approximately £3,000,000.

5. For a period not exceeding —— weeks:

(i) The miners will accept a reduction of —— per cent. in minimum wages (other than subsistence rates) in all districts.

(ii) The owners will bear wages equivalent to 100 p.ct. of ascertained net proceeds (in January-March) so far as necessary to maintain those wages.

(iii) The Government will fill the gap with a subsidy to be debited against the £3,000,000 aforesaid.

6. In the meantime:

(i) A Board shall be set up consisting of three representatives of the coal owners and three representatives of the miners, with an independent Chairman.

(ii) The Board shall frame a national wages and hours agreement governing the principles on which the general wage rates should be ascertained in each district, and shall also decide the minimum percentage on basis, taking into consideration the state and prospects of trade, the reorganization proposals of the Commission, and other relevant factors.

(iii) Subsistence wages shall not be reduced in any district where they at present yield 45s. per week or less for a full customary week.

(iv) The Boards shall decide also what the districts shall be.

(v) The Board shall issue its decision within three weeks.

(vi) In the event of disagreement in respect of wages, the decision shall rest with the independent Chairman.

7. If the parties agree that it is advisable that some temporary modification should be made in the statutory hours of work, the Government will propose the necessary legislation forthwith, and give facilities for its immediate passage.

8. Any balance of the £3,000,000 aforesaid will be available for a "tapering" subsidy after the period referred to in paragraph 5, or such other purpose as may be agreed upon between the Government, the Mining Association, and Miners' Federation.

9. The provisional undertakings made by the Government in this memorandum are conditional on the acceptance of its terms by the other parties.

ELECTRICITY SUPPLY MEMORANDA.

IT is sometimes worth while to give consideration to the views of observers of one's doings, even though they may not be immediately connected with the same interests as those in which one is engaged. At times, there may be disagreement with them; on occasion, the drift of the observers' ideas or criticisms may afford a new point of view. In the first number this month of "Electrical Industries," a sensible article on the question of what is actually required for the development of the electricity industry appeared. The writer of it was drawn to inquire the reason for the attitude of the gas industry towards the Electricity Bill. It says that "one of the most curious features of the situation created by the Electricity Bill has not yet been appreciated. The gas industry has declared its intention of not opposing the Bill. Why?" Our contemporary does not answer the question; but it allows its readers to infer what, in its opinion, is the correct reply to make. It is that the Electricity Bill in itself, apart from its financial features, and its proposals to invest the Electricity Commissioners with so much power, is one of the most innocuous schemes, so far as the gas industry is concerned, which has ever been evolved by Parliament. It is stated that it was largely the opposition of the gas people which led to the drastic reform of the Electricity Bill of 1919. Perhaps the electricity industry has in this something for which to be thankful to the gas industry, in that, had the full powers of the draft Bill of 1919 become an Act of Parliament, there is little doubt that, when the Labour Government were in power, they would have cast eyes on the industry as a well-matured subject for nationalization. Our contemporary points out that the present measure proposes to devote over 33 million pounds of State guaranteed capital to the development of a "cheap and abundant" supply of electricity on an "unprecedented large scale." It is also said that the object aimed at by this expenditure is roughly to multiply the consumption of electricity about two-and-a-half times. Further, that if there were any reasonable prospects of the Bill producing this result, the gas industry would be the first to protest against what is in effect a State subsidy for its main rival. We are pleased to see the acknowledgment in an electrical paper that the guarantee is "in effect a State subsidy," because this fully justifies the opposition that the gas industry is levelling against the preferential consideration of the electricity industry for State guaranteed capital. But, of course, the gas industry knows full well that the 33 million pounds do not constitute by any means the total capital commitments which the scheme will involve, and which (other than the sum named) the electricity industry will have to find without any guarantee being attached by the Government. The belief also exists in the gas industry, as it does in many important quarters in the electricity industry, that the huge capital expenditure which will be cumulative in its incidence will not contribute to the reduction of the cost of electrical energy in the way that has been predicted by those who have been instrumental in forcing this scheme upon the industry, in lieu of normal development. Our contemporary refers to the optimistic estimates which lie behind the Electricity Bill; and it says that it is quite obvious to practical men that the machinery contemplated by the Bill will not bring about this revolution, owing to the complex and cumbrous character of the machinery, as well as to the inertia of the undertakings concerned.

Why?

What is Wanted.

Another point made by our contemporary, in connection with the question of price, is that people who are very voluble about the backwardness of the electricity industry and the high cost of current apparently do not realize that, "while they cheerfully (?) pay 70 p.ct. more than they did in 1914 for most commodities, they need not grumble at getting their current on practically the same basis as in 1914." The statement is not true as applied to all districts. We admit that it is correct in some; and it may be confessed that the fact does not appear to have been sufficiently realized by—at any rate, some—gas undertakings in those areas where the price of current has been reduced practically to that obtaining before the war. If it were not that the heat value given in gas is a great deal more than that supplied by electricity for equal expenditure, the competition with the latter would be of a more acute order. Our contemporary concludes that output is an immensely more important factor than anything else connected with the supply of electricity, and that output has its origin in the work that is

done at the sales end of the operations of an electricity undertaking. Again we agree; and the same applies to gas output. Apparently, our contemporary would have those in authority shift the ground of their consideration of what is desirable in connection with the industry from the generating end to the sales end. It is submitted that a fundamental mistake has been made from 1882 onwards, and right up to the Weir Report and the present Electricity Bill, in concentrating on the generating end of the mains, while the consumers' end has been neglected. It urges, too, the training of suitable men as sales engineers in every department of electrical application. In conclusion, it submits that the only way to generate cheap electricity is to sell it cheaply.

Mr. Chattock's Suggestions.

The views of Mr. R. A. Chattock, the President of the Institution of Electrical Engineers, on the Electricity Bill are well known. He sees waste and exaggerated notions as to advantages throughout what is proposed. But much of what has been written in opposition to the Bill and the scheme, he says, has been destructive, and will not help the Government to any great extent. If such criticism would only force the Government to realize the gigantic error they are making, it would be one of the best pieces of constructive work that has been done in this connection. However, Mr. Chattock essays to be constructive in an article which he has contributed to the electrical papers; and what he says of a suggestive nature is well balanced by fresh destructive criticism. He speaks of the delay that arises in obtaining new powers, and urges simplification of the procedure. But in his view, what with the Central Board and the Electricity Commissioners with a long tail of formality, he foresees the present hampering legislative process becoming still more so. He does not see that the control by a Board of the stations in large industrial areas can have any effect upon the cost of producing electricity in them. It is only in the case of a large number of small generating stations that improvements can be looked for. He proposes that the big stations in the industrial centres should be allowed to develop on present lines, and that they should be permitted to supply the surrounding areas. But, in his opinion, there is at present insufficient machinery set-up to enable large industrial generating centres to transmit current to the smaller towns and the rural districts. This is where, in his opinion, a Central Board might do valuable work—by having powers to purchase from the existing large centres the current they require for distribution, and to retail it in bulk to the outside distributing authorities. The retail charge would naturally cover the cost of transmission and administration. The benefit to the smaller undertakings would be that they would receive current at a cost cheaper than they could generate it at their own stations, which they could eventually close-down. Such procedure, as Mr. Chattock points out, would not savour of coercion—hinted at in the Bill. What he proposes in this regard is very similar to what has been advocated in the gas industry, except that, instead of having a "middleman" in the shape of a Central Board to purchase from the central works the gas required for small towns and rural districts, the large undertakings would carry on this business direct. In support of his suggestion Mr. Chattock says: "It would be attractive to the large centres to sell current in this way, at cost price, as their turnover would be largely increased, and though their load factor would only be slightly improved, the fact of the larger turnover would really enable current to be produced more cheaply. The stimulus of competition in low cost of production would also remain between different areas—a most valuable asset. There would be no such incentive left under the scheme outlined in the Bill." He is also favourably inclined to coupling-up the large generating stations in each area; but he cannot see that a national linking-up is in any way justified. With developments on the lines he suggests, the standardization of frequency would be unnecessary. A highly important consideration in connection with the proposed "grid-iron" is the danger of concentrating such an enormous capacity of plant on one system. The tendency at the present time is to sectionalize the main system network more and more, partly to limit the effect of disturbances, and partly to enable the control switchgear to operate with certainty. Even at the present time the large size and capacity of the switches that have to be employed is increasing the cost of switchgear out of proportion to the rest of the station. In view of Mr. Chattock's position as President of the Institution of Electrical Engineers, his article no doubt reflects very much the views of the Council of that body.

Municipal Wiring and Selling Powers.

The Local Legislation Committee of the House of Commons must be getting a bit sick of hearing similar evidence regarding wiring and selling powers, together with authorization to open showrooms. The applicants have presented much the same evidence, with a little local colouring to make it differ from that which has been heard before; the opposing contractors have followed a similar course. The latter do not want to deprive local authorities of powers and financial resources for developing electric wiring and the sale of appliances, but they wish the work to be carried out through them. In other words, they feel they cannot shoulder the responsibility as can the local authority; but at the same time they desire to be assured that a profit comes their way from all such work. That is a condition most of us would like to be in—to have someone else develop business for us to carry through, and from which we could realize a respectable profit. The last case which has engaged the attention of Section A of the Local Legislation Committee is that of the Guildford Corporation. The clauses were much the same as those of other Bills which have in times past claimed the consideration of the Committee. It seems to be an impressive thing to tell the Committee that the majority of the houses in the district are small, and that such houses cannot afford the initial cost of electric wiring and purchasing appliances. From our experience of the tenants of such houses, they cannot afford to spend a great deal on the most expensive system of heating and cooking. The Guildford Electrical Engineer (Mr. W. E. Affleck) stated in his evidence that one of the main reasons that he required hiring and hire-purchase powers was to develop the cooking load; but he objected to attaching to the granting of powers any promise that the wiring should be carried out by the contractors, for that meant the Corporation would be financing the contractors, who would stand to gain everything and lose nothing. It was a tactical mistake to tell the Committee that the Corporation could carry out the work probably cheaper than the contractors, and that the price charged would be as near cost as possible. The statement immediately raised the question of unfair competition with established local traders.

Counsel from the Chairman.

However, the Corporation obtained the powers, as well as a little advice from the Chairman of the Committee (Sir Thomas Robinson). He announced that from the evidence laid before the Committee they had concluded that the provision of electrical installations in small property by means of deferred payments had been very successful. It had been beneficial to the consumer, had improved the load factor at the generating stations, and had reduced the costs and the price charged for current. Therefore, the Committee felt justified in granting the powers. Then followed some wise advice. The Committee also felt the Corporation should go slow in this matter; and in the interests of the consumer should consider every move they made in connection with it. The consumer is the last thought; the whole desire is to improve the load on the generating station. Of course, the Committee were not told that. However, other advice was that where there are wiring firms upon whom the Corporation can rely to do good work at reasonable prices, they would do well to employ those firms, and seek their co-operation. Also, whatever staff the Corporation employed in the exercise of these powers should be fully occupied. The powers, the Chairman declared, would enable the Corporation to protect themselves against high prices. In every case that had been before the Committee, the Chairman said they had satisfied themselves that there was in this work room for both corporations and contractors. The Corporation were charmed with the kindly advice of the Chairman; and the contractors, while they had not succeeded, also appreciated his words. But on reflection the latter will remember that the counsel does not stand as part of the Bill, and the actions of the Corporation will be guided more by the provisions of the measure than by anything outside it.

Defective Flexibles.

There is a great deal of ignorance extant regarding the dangers of defective electric flexibles. Many people have experienced shocks owing to the fraying or abrasion to which such cord is subjected in use, and from time to time there have been fatal accidents through such neglected cords. At Torquay recently a boy, who was an apprentice to an electrical trader, received a fatal electric shock while working in the basement of his employer's premises. An old flexible cord was used for supplying light in the cellar from the shop above (which was rather a bad form of fitting on the premises of an electrician). The defective cord appears to have been making contact with a stack of tubing; and the cellar was damp. The Borough Electrical Engineer (Mr. H. F. G. Woods) gave evidence that the flex had been badly rubbed in two places, and that, if it became entangled with the tubing, the whole of this would become alive. In medical evidence, it was stated that the boy was in somewhat abnormal condition. Although the Coroner returned a verdict of "Accidental Death," he made the remark that he could not shut his eyes to the fact that there had been thoughtlessness; and, for all he knew, a jury might have taken a more serious view of the matter. He hoped that those who read of the case would see that proper precautions were adopted against such a tragedy as this.

North of England Meeting.

We are asked by the Secretary of the North of England Gas Managers' Association, Mr. Norman S. Cox, of Sunderland, to call attention to the new date fixed by the Committee for the holding of the meeting which had to be postponed on account of the general strike. It has now been decided to carry out the programme on Friday, the 28th inst.

GAS AND COKE SUPPLIES DURING THE GENERAL STRIKE.

From various quarters of the country, we have received information as to the position of gas and coke supplies during the general strike, and hope to receive more before our next issue.

BRIGHTON AND HOVE GENERAL GAS COMPANY.—Mr. C. H. Rutter (the Engineer and General Manager) informs us that, so far as the Brighton Gas Company are concerned, they have had no difficulty whatever in connection with the manufacture or distribution of gas, and both processes have been normal throughout the strike. As far as he can understand, the union leaders changed their minds as to the desirability of calling out workers at the gas and electricity works in various parts of the country; but, in any circumstances, in his case he does not think any order by the union to cease work would have been obeyed by more than a mere handful of the men, on account of the firm hold which co-partnership has among the employees, the principle of which, he feels convinced, is valued very much more than any nebulous benefits attached to trades unionism. In accordance with the Emergency Directions, the pressure of gas was slightly reduced, and industrial concerns rationed to a certain extent, both for gas and coke. Of course, while the coal strike lasts, these regulations will have to continue. Otherwise the business of the Company is being carried on as usual.

BRISTOL GAS COMPANY.—The position in Bristol, says Mr. S. E. Halliwell (the Secretary and Commercial Manager of the Bristol Gas Company), was satisfactory, and the Company were able to give ample supplies of gas and coke for all requirements. Persistent and mischievous rumours of extension of the strike to gas workers created a very disturbing atmosphere among consumers and everybody concerned; but the whole of the men obeyed the instructions of their union, and remained at work. Consumers have expressed their appreciation of the continuance of the supply throughout the crisis; and it has certainly impressed upon them the value and importance of gas for domestic uses. The following letter from the Medical Officer of Health, published in the local papers, emphasizes this point.

DOCTORS' TESTIMONY TO THE VALUE OF GAS.

Public Health Offices,
Bristol, May 8, 1926.

We have no wish to interfere in the present industrial dispute, but we trust that nothing will take place to limit the supply of gas to the city.

In the first place, the hospitals, devoted particularly to the care of the sick poor, are dependent upon gas for their cooking; and it is essential that properly prepared food should be supplied to invalids, otherwise their recovery will be much retarded or in some cases a fatal issue may result. Many of the hospitals have no alternative means of cooking if the gas supply is cut off.

In the second place, gas has now become an essential factor in the lives of the great majority of the people, and is widely used not only for purposes of lighting, but particularly for cooking. Deprivation of this would mean not only that the adult workers would be improperly nourished, but that the children, upon whom the future of the race depends, would suffer especially, and might be permanently damaged through life.

Food properly prepared is particularly essential for the growing child, and, though the adult body may successfully resist the temporary inconvenience, it was proved during the war that the young child, and particularly the growing child, was open to serious damage in the absence of adequate, sufficient, and properly prepared food.

Deprivation of gas under present conditions practically amounts to deprivation of food.

(Sgd.) D. S. DAVIES,
Medical Officer of Health.
(Sgd.) R. A. ASKINS, M.D.,
Deputy Medical Officer of Health.

BIRMINGHAM.—Apart from an atmosphere of excitement, which naturally caused a little unrest and some anxiety, the employees of the Birmingham Corporation Gas Department, we hear from Mr. A. W. Smith (the General Manager and Secretary), carried on quite normally, with the exception of a few men connected with the building trades, who were called out by their respective unions at the beginning of the crisis.

BOURNEMOUTH.—Mr. Philip G. G. Moon (the Engineer and General Manager of the Bournemouth Gas and Water Company) is able to report that the gas supply to Bournemouth was maintained without incident. Various rumours were circulated in the town to the effect that the Company's employees were coming out on strike immediately; and he therefore called the Co-Partnership Committee together to discuss the matter. The result of this discussion was that a notice was sent to the Press and the local station of the British Broadcasting Company, signed by Mr. Moon and the Chairman of the workers' side of the Co-Partnership Committee, stating that there was no foundation for the rumour that the Company's employees were about to cease work.

BRADFORD.—The Bradford Corporation Gas Department, says Mr. Charles Wood (the Engineer and Manager), carried on without the slightest difficulty. There were plentiful supplies of coal and coke, and no interference with their transport. Fitters, engineers, retort setters, masons, transport workers, mainlayers, plumbers, and other tradesmen were ordered out; but all continued their work except the driver of Mr. Wood's own car—one man on strike out of 960. The quality and pressure of gas were maintained as usual.

CARDIFF.—The Cardiff Gas Light and Coke Company, Mr. H. D. Madden (the Engineer and Manager) informs us, lost only four bricklayers, who went on strike in accordance with their union's instructions. The retort setters in the employ of West's Gas Improvement Company, who were engaged at the gas-works, were also called out by the local union. Naturally such defections were not of serious moment, and did not cause anxiety. The Directors had provided large stocks of coal and other materials necessary for manufacture. From the beginning of the strike the works were guarded day and night by a small body of police. The workmen carried out their duties normally, and without trouble.

DONCASTER.—No trouble whatever was experienced at the Doncaster Corporation Gas-Works during the strike. The men worked normally, and absolutely without friction. Mr. Robert Watson (the Engineer and General Manager) writes: "We have, of course, complied with the instructions given in the Coal Emergency Order as to conservation of coal, increased use of carburetted water gas, and restriction of pressures. In spite of the closing-down of industrial works and some reduction in pressure, our output has not decreased. I had been for some time making a point of getting good coal stocks; and with the help of the carburetted water gas plant, I think we could carry on for three or four months.

EDINBURGH.—From Mr. H. H. Gracie (the Engineer and Manager of the Edinburgh Corporation Gas Department) we hear: "No trouble was experienced in this district through the gas workers going on strike—in fact, every man was at his post at starting-time more punctually than normally. As the Granton Works are situated a long way from the town, some of the old men had to walk a distance of 5 to 6 miles to take up their work, and also to cover the same ground after their shift was completed. In order, however, to assist the transport arrangements, we provided two motor lorries which conveyed the men to and from the works; and this was greatly appreciated by the men. We had intimation that fitters, turners, &c., were to be withdrawn; but immediately we got in touch with the Federation, we had the assurance that this was not official—the Federation having been in touch with the engineers' headquarters in London. Large increases of gas were recorded daily; and it appears that the public appreciated the benefits of the service during the emergency period. We had stocks of coal in hand to last for about twelve weeks at normal consumption."

HASTINGS.—Mr. Charles F. Botley (the Engineer and General Manager of the Hastings and St. Leonards Gas Company) writes: "As regards gas supply, there has been no difficulty at all. Everything has been normal. Many of our men belong to the National Union of General and Municipal Workers; but they were not called out, and I understand had no wish to be interfered with. 'The wish was father to the thought;' for there were constant rumours in the town that the 'gas men' were on strike. Indeed, my own chauffeur was waiting for me, when he was approached by a man who accused him of being a 'swab,' or blackleg, on the strength of the rumour that the 'gas men' were out, while he was at work. In our case we were complying with the spirit of the Emergency Order, because we were using carburetted water gas plant as much as practicable. At the outbreak of the strike, I gave intimation that the normal supply would be maintained; and, so far as one can judge, there has been no effect one way or the other on consumption. I have certainly noticed a tendency to have gas fires fixed or made ready. As regards coke sales, there has been an increase recorded—so much so that our Glyne Gap Works have had to be closed from time to time. My policy has been to furnish the Company's regular coke customers with the normal supply; and I have refused or postponed other applications."

LEEDS.—The position in Leeds, when the strike was called off, Mr. C. S. Shapley (the Engineer and General Manager) states, was that the Corporation Gas Department had not a single man out. The total number who went out was seventeen—sixteen fitters and labourers, and one pavior. These, however, all returned. The men behaved themselves remarkably well, and diligently followed their pursuits during the whole crisis. The Department hold good stocks of coal and oil; and there is no danger of any cessation of gas supply in the city.

LEICESTER.—The Leicester Corporation Gas Department passed through an anxious time without any great trouble. Mr. Hubert Pooley (the Engineer and Manager) informs us that the Department were able to maintain fully their services to all consumers.

LIVERPOOL.—Mr. R. E. Gibson (Engineer of the Liverpool Gas Company) writes: "I am pleased to say that we were well prepared as regards stocks of raw material, and had sufficient to carry us over a period of sixteen weeks at the normal rate of summer use, and assuming that quality would be main-

tained at the declared value. The only labour troubles that we have experienced have been with the bricklayers, tinsmiths, and motor drivers. With regard to the bricklayers, both the Company's and the contractors' men went on strike—about 70 in all. If these men had remained out for a long period, our programme of reconstruction and renewals would have been seriously delayed, and this might have resulted in shortage of available plant at the time of peak load next winter. On Wednesday, May 12, about half-an-hour before the announcement was made that the general strike had ended, 39 of our tinsmiths (out of a total of about 80), went out at the call of their union. We have agreed to take these men back on Monday, the 17th inst. With regard to motor drivers, we were successful in obtaining permits for most of these men to continue working, and have not suffered any serious inconvenience on their account. The transport by water of our acid for sulphate making was stopped, and our stock ran very low before resumption of deliveries. Altogether, things with us might have been very much worse; and we congratulate ourselves upon having come through this ordeal with so small an amount of inconvenience. It is satisfactory to note that the whole of the gas workers remained at their work."

London.—Supplies of gas were fully maintained.

Manchester.—One or two slight difficulties, which were soon righted, were experienced by the Manchester Corporation Gas Department; and except for these, work continued as usual throughout the strike. Mr. J. H. Sillitoe (the Secretary) tells us that the consumption of gas was well maintained; increased domestic use making up for loss in the industrial field and workshops, &c.

Newcastle-upon-Tyne.—Mr. Frank P. Tarratt (the Engineer of the Newcastle-upon-Tyne and Gateshead Gas Company) writes: "We have been able to maintain satisfactory and normal supplies of gas since the strike commenced; and we see no reason—having regard to our stocks of coal and oil—why these supplies should not be continued without material alteration for some considerable time. The sales of gas have been slightly below normal; and although we are probably suf fering as much inconvenience as anyone, there is every reason to believe that we shall be able to carry on satisfactorily."

Norwich.—The operations and business at the Norwich Station of the British Gas Light Company, Ltd., have not been seriously affected by the strike. Mr. Thomas Glover (the Engineer and Manager) wrote on May 15: "The calling of the coal strike and the general strike found us with ample stocks of coal and oil, an installation of vertical retorts in splendid condition, and with water gas plant which was put to work immediately deliveries of coal were stopped. Until Friday morning last, deliveries of coal from our stock at one of the railway stations, deliveries of coke, and deliveries of material for distribution and sales of gas, went on normally; but on Friday morning, May 7, all the transport men, numbering about 22, were withdrawn. This caused some amount of inconvenience; but we were able to make such arrangements as enabled us to carry on a full supply of gas, which is much appreciated at all times, but particularly when the supply of solid fuel is reduced and the complete stoppage of supplies is threatened. We have reason to believe that our men would not have answered any call to cease work, or would have done so very reluctantly, as was the case with the transport men. The sales of gas have suffered owing to the closing of, or short time at, the factories and the reduced income of the working classes. In the unlikely event of the coal strike lasting, this Company are in a position to continue a full supply of gas, if we are allowed to do so, for a considerable time."

Nottingham.—The Nottingham Corporation Gas Department suffered no serious inconvenience during the period of the strike. Mr. J. Wilkinson (the Engineer and Manager) writes: "Lack of railway transport has, of course, compelled us to put a considerable tonnage of coke into stock; and we have had to take our daily requirements of coal out of stock. We were also compelled to obtain supplies of sulphuric acid for our sulphate of ammonia plant by road; and for this purpose we utilized a watering tank belonging to the Corporation. There were many rumours from time to time to the effect that our men were going to do this, that, and the other; but such rumours were absolutely unfounded, and, so far as I can gather, none of our men were ordered to strike. A strike notice was issued to our engineers; but this was due to an oversight, and the notice was withdrawn or cancelled a few hours later. There was a reduction in the output of gas, though this was not so large as anticipated. Nottingham is adjacent to the Notts and Derby coal-fields, and up to the present time there has been no lack of fuel for domestic purposes; but I am of opinion that if the coal dispute continues for another week or so, stocks of domestic fuels will be rather depleted, and we shall then have a run on gas coke. I might, perhaps, add that, with a view to looking well ahead, I immediately gave instructions for the calorific power of the gas sent out to be reduced from 475 to 450 B.Th.U.; and we shall work accordingly until the Emergency Regulation Act is withdrawn."

Plymouth.—The whole of the gas workers of the Plymouth and Stonehouse Gas Light and Coke Company, we learn from Mr. P. S. Hoyte (the Engineer and Manager), remained absolutely loyal to the Company during the strike; and although they were not called out by the union, he does not think that more than a few individuals—and possibly not even these—would have responded in such an eventuality. The building trades operatives (masons and carpenters) left most reluctantly at the bidding of the union; but on the personal request of the union organizer, and that of each one of the eighteen men concerned, they have been reinstated without any loss of co-partnership or superannuation benefits.

Portsmouth.—From Mr. T. Carmichael (the Engineer of the Portsea Island Gas Light Company) we learn that so far the position of his Company remains satisfactory. They are carrying on as usual, although they are still required to comply with the Coal Emergency Directions in connection with the manufacture of gas; and in this respect the percentage of water gas has been increased from 20 to 40. The stocks of coal and oil at the beginning of the stoppage were sufficient for three months' requirements; and the surplus coke is being supplied by permits issued by the local government authorities, to food-producing firms, hospitals, and similar institutions.

Preston.—Mr. Samuel Tagg (the Engineer and Manager of the Preston Gas Company) writes: "I am glad to say that no attempt was made to withdraw any of our labour, and that all our employees rendered loyal and willing service. Had the union given instructions for a stoppage, it is probable that many of the members would have ceased work; but I know there was a very general desire to continue working, and that it was felt that the T.U.C. in calling a general strike had exceeded the legitimate functions of the trades unions. Although a stoppage appeared unlikely, tentative arrangements were made for voluntary labour, which would have enabled a supply of gas to be maintained. I think the experiences of the past fortnight will tend to improve the good relations which happily exist between employers and employees in the gas industry."

Sheffield.—Except for the restrictions placed on gas undertakings by the Coal (Emergency) Directions, under the Emergency Powers Act, 1920, the Sheffield Gas Company carried on as usual. The closing-down of the steel and engineering works reduced the gas consumption; but otherwise nothing of an unusual nature occurred. Mr. Ralph Halkett (the General Manager and Secretary) adds that, so far as the men are concerned, every one has been at his post, and has worked quite satisfactorily. The Company have had no difficulty in this connection.

Southampton.—The output of gas by the Southampton Gas Light and Coke Company was, Mr. J. R. H. Jacobs (the General Manager and Secretary) states, fully maintained; and no anxiety was felt at any time, as all the employees seemed anxious to do whatever was required of them. The bricklayers and retort setters ceased work in the early stages of the strike, on receipt of instructions from their union secretary. Mr. Jacobs was, however, fortunate enough to meet them as they were leaving the works; and after a few minutes' interview they all returned, and continued work with the rest of the employees. Many employees volunteered for special duties, if they were required; and the Directors are very pleased at the loyalty shown by all.

Stafford.—The Stafford Corporation Gas Department fared very well during the industrial upheaval. In the first place, Mr. T. H. Poulson (the Engineer, Manager, and Secretary) pays a tribute to the loyalty of all the staff and workmen. The Department fortunately had provided stocks of coal for four months; and the small request for coke recently gave them a stock with which to meet the extra demand which they are now experiencing. They have fair storage for tar and liquor, and altogether business is going on much as usual. The mining dispute found the local coal merchants very short of coal to meet local demand; and the Gas Department are acting as good Samaritans by supplying them with 500 tons for sale for household purposes. Years ago it was suggested that gas undertakings should become the sole fuel suppliers for a district; and it seems that, in the great emergency, the Stafford Corporation Gas Department have been largely acting in this capacity.

Stockton-on-Tees.—On April 19 the Stockton-on-Tees Corporation Gas Department advised all their coke consumers that, in case of stoppages of coal to the gas-works, all coke supplies would be suspended. By this means, says Mr. W. W. Atley (the Engineer and Manager), arrangements were made for all the usual coke customers to fill-up their storage; and in consequence the Department have endeavoured to give the best services possible in the circumstances. Coke is being rationed, and will continue so until the miners are back at work. With the exception of lowering the calorific value from 500 (declared) to about 450 B.Th.U., the gas consumers have suffered no inconvenience whatever. An advertisement appeared in the local papers, and also posters on the district, advising consumers to adjust their burners to suit the altered quality of the gas. As a result, there have been very few complaints due to the altered conditions. The Department have good supplies of both coal and coke, and can, if necessary, keep up full supplies of gas for a considerable period. There has been no trouble whatever with any of the workmen; and the distribution work has continued as usual.

Swansea.—Mr. W. H. Johns (the Engineer and Manager) advises us that ample stocks of coal, coke, and gas oil rendered the position of the Swansea Gas Light Company comparatively secure.

(*To be continued.*)

PERTH GAS UNDERTAKING CENTENARY.

Works Old and New.

Mention was made, when recounting in the last issue of the "Journal" the inauguration of a new gasholder at the Friarton Gas-Works of the Perth Corporation, of the preparation of an illustrated brochure to mark the centenary of the undertaking. The ceremony of opening the works extensions was performed on April 30 by Lord Provost Thomas Dempster, J.P., who afterwards planted an oak tree near the new holder in commemoration of the centenary of gas lighting in the city.

In the year 1824 a Company for the supply of gas was formed in Perth by Mr. George Gray, of Bowerswell, who acted as Secretary until the undertaking was purchased by the Gas Commission in 1871. Works were designed and erected by Mr. Adam Anderson, LL.D., Rector of the Perth Academy; and the production of gas commenced early in 1825. So satisfactory were the financial results that another Company entered the field some twenty years later; and competition between the two proceeded briskly until 1868, when an amalgamation was effected. At that period the manufacturing capacity of the first Company's works was about 29 million c.ft. a year, while the output of the new Company was some 11 million c.ft.

The Managers of the original Company included Mr. Reid, Mr. Angus M'Pherson, and Mr. Thomas Whimster. When the two Companies amalgamated, Mr. Whimster (who had been appointed in 1851) retained office; and he continued to hold his position under the Gas Commissioners until 1895, when he retired, after a period of faithful service extending over 44 years. His successor was Mr. Andrew Wilson, who was Manager from 1896 to 1900, when he resigned, and Mr. W. B. McLusky took up the appointment. Mr. McLusky remained at Perth until he received his present appointment at Halifax at the end of 1911; and Mr. David Vass, the present Engineer and Manager, took up the duties on March 1, 1912. Mr. M'Gillewie, the Treasurer of the old Company, also retained his appointment under the Gas Commissioners until his death in 1893. Mr. C. J. Lindsay succeeded him.

For two years the Gas Commissioners continued to make gas at the two works—the Canal Street works of the original Company and the Blackfriars works of the new Company—but in 1873 it was decided to carry on manufacturing operations solely at Canal Street. Then followed a long period of increasing consumption of gas and gradual extensions of plant, until, in 1895, owing to this continually growing demand and the difficulty of meeting it, a proposal was made for the transfer of the whole of the works to the Sand Island. Mr. William Foulis was asked to report upon this site; but a new scheme to remove the works to Friarton was afterwards proposed, and met with acceptance.

Friarton Works.

A site on the Friarton Farm was secured; and plans having been prepared by Mr. G. P. K. Young, of Perth, the work of levelling the site and building the boundary and retaining walls was soon in operation. Plans were also put in hand for a retort house, &c., which were subsequently approved by Mr. J. Hepworth, of Edinburgh. In 1898 tenders were asked for; and in the following year it was decided to call in an independent Engineer to carry through the construction of the new works—Mr. Andrew Gillespie, of Glasgow, being appointed. The gas delivered in 1896-97 was about 124¾ million c.ft.; and in 1899-1900 the output had increased to, in round figures, 160½ millions. Thus, extensions of the Friarton scheme (which, owing to the limited borrowing powers of the Corporation, had been very materially reduced from what was originally intended) were destined to be early called for.

The new Friarton Works were opened on April 26, 1901—a quarter of a century ago. The retort bench then erected was equal to a make of a little over three-quarters of a million c.ft. per 24 hours, with space available for duplicating within the same house. Charging and discharging was by West's manual machines. In December of the same year, the Manager was authorized to prepare plans for an extension of the retort-bench. Further plant was added from time to time, until in 1909 a Special Committee were appointed to visit works in England for the purpose of inspecting stoking machinery. The result was the decision of the Town Council in 1911 to introduce the De Brouwer charger and discharger. Then came the difficult war years, during which the undertaking had the common troubles of the industry to contend with.

The next important stage in the history of the concern was reached when the Gas Committee, in 1919, remitted to the Manager to prepare a report on the whole matter of the manufacture of gas and its supply and distribution. This report was prepared, and was followed by a request of the Town Council to the Gas Committee to consider the advisability of introducing vertical retorts. This matter was placed in the hands of a Special Committee, who were authorized to consult an expert before visiting other places where vertical retorts were in operation. Mr. W. Doig Gibb was selected, and presented a report, after which visits were paid to Uddingston, Hamilton, Helensburgh, and Greenock, to inspect the systems of vertical retorts in use there.

Glover-West Vertical Retorts.

The upshot of all this was a decision by the Town Council to equip their works with an installation of Glover-West continuous vertical retorts. This comprises forty retorts, arranged in five settings, and heated in units of four. Each setting is equipped with a steel brick-lined chimney and a waste-heat boiler operating under natural draught. The nominal capacity of the plant is 1,500,000 c.ft. of gas per diem.

Coal is brought to the installation in wagons running on the elevated railway. It is discharged from the wagons by a hydraulic tipper into a receiving hopper, from which it is fed mechanically to a coal breaker. The broken coal is elevated and distributed in the overhead storage bunkers of 48 hours' capacity by means of a West lip-bucket conveyor, which also receives the coke as discharged from the retorts, and elevates and discharges it over screens to 50-ton coke-storage hoppers. These hoppers are fitted with slide doors for feeding railway wagons running on the low-level track. The coal to the retorts and the residual coke from them, as well as the necessary coke fuel to the producers, are mechanically handled by electrically-driven machinery. The retort house is an adaptation of a steel-framed brick-panelled addition built upon the walls and structure of the original retort house. The new installation has more than four times the capacity of the horizontal retorts removed from the site.

The installation was formally inaugurated on April 19, 1923, by Lord Provost the Hon. John Dewar, supported by Bailie Hunter (Gas Convener) and a distinguished company of guests, including Lord and Lady Forteviot and the Earl of Moray.

Holder and Other Work.

Next it was decided to accept the offer of Messrs. R. & J. Dempster, Ltd., for a 1 million c.ft. set of water-tube condensers, and to submit proposals to the Unemployment Grants Committee in connection with the erection of a new holder, with a view to finding suitable relief for unemployment during the ensuing winter. The holder and tank were approved for the purpose of a grant of 50 p.ct. of the interest on the loan raised to meet the expenditure on the scheme, not exceeding £27,000. Some time later it was arranged with the Unemployment Grants Committee to extend the scheme at a cost of a further £5000 so as to include the transfer of the distribution control to Friarton, thus centralizing it.

A description of this work, together with that of building the new holder and tank (the contract for which was placed with Messrs. R. & J. Dempster, who carried out the job under extremely trying conditions), forms a supplement to the booklet. The scheme included an automatic governor by Messrs. Bruce, Peebles, & Co.; compressors, regulators, valves, &c., supplied by the Bryan Donkin Company; and a bitumen melting and mixing plant, by the Chemical Engineering and Wilton's Patent Furnace Company. In all, 28 contracts were placed for the whole scheme; and the original estimate of £32,000 will not be exceeded by more than 1 p.ct.

The policy formulated was really that the locus of the distribution system, both low pressure and high pressure—gas is boosted west to Methven, 7 miles, and the intermediate villages, and also to Bridge of Earn to the south, 4 miles—should be transferred to the manufacturing station at Friarton (or No. 2 Centre), but still keeping the gasholders, governors, and boosters at the Shore (or No. 1 Centre) intact as a distribution centre ready to be put into operation if need be. The two gasholders at the Shore would in this case be supplied from the heavier No. 3 holder, now constructed at No. 2 Centre a mile away; but they would normally be filled with gas in reserve. The scheme called for: (1) The erection of a new gasholder, complete with inlet and outlet gas mains, at the works (No. 2 Centre). (2) By-passing the holders at No. 1 Centre. (3) The laying of a 6-in. high-pressure steel main to No. 1 Centre and the laying of a 4-in. high-pressure steel main to a point on the Bridge of Earn route. (4) The erection of a governor and booster house, complete with station governor and duplicate boosters.

According to the dual purposes of the new gasholder—*i.e.*, distribution or relief—it was necessary to allow for either of these purposes in the arrangement of the inlet and outlet mains. On the existing outlet main from the station meter, just outside the meter house, had been superimposed a small Livesey washer, used originally for naphthalene extraction, but now no longer required; and this formed the key to the scheme. The inlet and outlet mains of the washer were to fulfil the same functions for the holder, while the by-pass for the washer was to be utilized as such when it was necessary to by-pass the new holder while working on No. 1 Centre holders, or in using the former as a relief holder only.

Before No. 3 holder could be used for distribution purposes, the two gasholders and the governors at No. 1 Centre would require to be by-passed. The governor being fitted with by-

pass mains and valves simplified matters; but it was necessary to lay a by-pass between the inlet and outlet mains of the gas-holders. Closing-down for making these connections being out of the question, recourse was had to the under-pressure system of Messrs. E. Pass & Co., of Denton.

Instead of governing each of the three districts, Perth, Scone, and Craigie, as is done from No. 1 Centre, it was decided that one governor at the new centre would serve the purpose of all three; and a new type of instrument was adopted for this purpose. This is a 24-in. automatic self-loading station governor (Simpson's and Peebles' patents). It consists essentially of two units: (1) A differential governor dealing with changes of inlet pressure, due to cupping or uncupping of the holder, and throwing a constant differential pressure across the valves of the self-loading governor irrespective of the pressure or consumption; (2) the self-loading governor, which throws a pressure proportional to the valve displacement. The principle employed to secure variation in pressure is that of the variable movement of a rolling weight moving in a definite direction through a curve acting in relation to the stroke of the valve. The governor was described and illustrated in the "Journal" for April 28, p. 208.

EXTENSIONS AT HEBDEN BRIDGE.

Additional Vertical Retorts.

The formal inauguration took place, on April 20, of additional Dempster-Toogood vertical retorts erected as an extension to the existing plant of the same type at the gas-works, at Hebden Bridge, of the Hebden Bridge and Mytholmroyd Gas Board. The original vertical retorts of this plant, completed in 1913, were by Messrs. Robert Dempster & Sons, Ltd., of Elland, and were the first Dempster-Toogood verticals. The four new retorts officially inaugurated on April 20—and which have been working for some time—are the second extension since the original setting. All the retort plant in the house is by Messrs. Robert Dempster & Sons, Ltd.

The visitors included members of the Board and gas engineers from various works.

The party assembled at four o'clock at the works, where a brief welcome was given by Councillor A. Sutcliffe, J.P., the Chairman of the Board.

Mr. J. W. Broadhead (Managing Director of Messrs. Robert Dempster & Sons, Ltd.), on behalf of the Contractors, presented a handsome rose bowl to Councillor Sutcliffe, who, after thanking the Contractors for this token of friendly relationship throughout the period of the work, formally declared the plant inaugurated. The whole company then went into the retort house, and witnessed the working of the plant in detail. Messrs. Broadhead, H. J. Toogood, and T. N. Nield (the Engineer and Manager of the works) undertook the duties of guides.

It was explained that bed No. 1 was the pioneer bed of four retorts (approximately 250,000 c.ft. capacity) of the "Dempster-Toogood" system, being installed in 1912 and formally opened in April, 1913. This, it was mentioned, was duplicated by bed No. 2 in 1915, thereby increasing the capacity to a total of 500,000 c.ft. a day. Bed No. 3 was the one recently added, and brings the total capacity up to 750,000 c.ft. per diem. It was the latter bed, together with new coal handling plant serving the whole of the three beds, that was inaugurated on April 20. A unique feature of the plant, it was pointed out, is that the bench is in reality two benches in one, inasmuch as bed No. 3 was built to the existing end buckstays of bed No. 2, and the tie bars uncoupled and reconnected one at a time. This gives the advantages of two separate benches, as in times of repair either bed No. 3 or beds Nos. 1 or 2 could be let down cold without interfering one with the other, and yet the bench, bracings, platforms, and tie-bars were all in line. This method saves bracing and retort-house length—the latter a very material factor on a works which, by reason of its position in a deep valley and confined area, has to utilize all available space.

On the ground floor an interesting feature was demonstrated. The Hebden Bridge retorts are built sufficiently high above the ground to enable coke to be taken direct from the retorts into consumers' carts. A lorry was backed under the retorts, and four retorts were discharged direct into this wagon, which was then dispatched into the town. The advantage of this method is that the coke is never handled, so that breeze is not formed, no water touches the coke, so that the consumer gets a dry, smokeless, and more readily ignitable fuel.

The party ascended to the top of the bunkers by a hoist which was designed and manufactured by Messrs. Robert Dempster & Sons, and which until lately was the only means for handling coal and coke. It has worked throughout the thirteen years since the establishment of the original vertical plant, night and day, and throughout the long period of war-time strain, without once jeopardizing the supply of gas to the town. The guides remarked that if the modern 8-hour day be taken as a measure of its service, then this hoist could be calculated to have worked for 39 years. It is still working, though now the new coal handling plant brings much relief. It was explained to the visitors that the overhead hoppers held sufficient coal to last the retorts for 48 hours, and that this obviated any week-end work in coal handling. The new coal plant was set to work, and the visitors saw the coal arriving, without any further handling, direct from railway wagons, and being deposited in the various compartments of the bunkers. The Engineer mentioned that what hitherto used to take practically the whole of the daylight hours of a winter's day is now completed by this new plant in 1½ hours.

Coke is stored with a minimum of handling, as high-level concrete floors in this wide retort house are used for coke storage, and carts backing underneath the floors are charged by gravity. Similarly, on the other side of the house, the coke gravitates from the floors into trucks on the railway siding. This special construction is particularly suitable for a works on a cramped site like that at Hebden Bridge.

The Dinner.

At the dinner held after the works visit, at the White Horse Hotel, Councillor Sutcliffe took the chair. Following the Loyal Toast,

Mr. J. Alex. Gray (Gas Engineer, Ashton-in-Makerfield), giving the toast of "The Hebden Bridge and Mytholmroyd Gas Board," said he was delighted to be present at the inauguration of this further development of the Hebden Bridge Works. He had had a long acquaintanceship with Mr. E. J. Wellens, the Engineer at Hebden Bridge when the original experimental vertical plant was put in, and whom he was glad to see present that day. Hebden Bridge was unusual in the constitution of its controlling authority, for there were very few elective gas boards in the country of the kind of that at Hebden Bridge. The majority of public-owned gas undertakings were conducted by committees which had to report to the local councils for confirmation or otherwise of their actions. In the case of a gas board like that at Hebden Bridge and Mytholmroyd, though it was a public body, it was responsible only to itself and its consumers. It had the great advantage of being appointed with full authority to run the undertaking on commercial lines, and free from any question of responsibility to furnish profits in relief of local rates. Though the Hebden Bridge undertaking, owing to the conditions under which it had been taken over, was heavily capitalized, it was able to sell gas cheaply, having in mind all the circumstances. The manufacture and sale of gas, Mr. Gray remarked, had been commenced by the old Hebden Bridge Gas Company in 1852, and the undertaking was taken over by the joint Local Boards of Hebden Bridge and Mytholmroyd in 1894, for the sum of £69,427. He noted that the annual make of gas since the undertaking had been under control of the Gas Board had increased from 60,260,000 c.ft. in 1896 to 118,875,000 c.ft. in 1925. The Board had done extremely well to cope with such a great increase in output in a severely restricted space as that which was available to them. He firmly believed that in these days, when gas was being sold on heating value, there was no method better capable of supplying the demands of the community, and giving a certain calorific value with perfect ease, than continuous vertical retorts. (Hear, hear.) The important duty of keeping to the standard was simple with continuous verticals. The Hebden Bridge undertaking, since the original vertical installation in 1913, had had to make two extensions. Even though the country was being flooded with electrical propaganda to-day, he fancied that it would not be very long before the Hebden Bridge Board would have to consider still further extensions to meet the growing demand for gas.

The Chairman, responding to the toast, said that when the Board bought the undertaking of the old Hebden Bridge Gas Company, they took over a supply area far wider than the towns of Hebden Bridge and Mytholmroyd alone. There were parishes in the neighbourhood, and though those parishes had not the power of election of the Board, and could not share in its profits or share responsibility for loss, they shared in all the benefits of a good gas service, and there was no preferential rate of charges in favour of one part of the supply area as against any other. When the Board took over the Company's assets and liabilities, there was an output of some 42 million c.ft., but the first balance-sheet issued by the Board, in 1896, showed an output increased to 60,260,000 c.ft. After thirty years, it had increased, as mentioned by Mr. Gray, to 118,875,000 c.ft. The Hebden Bridge Council had their own electricity undertaking, and they of the Gas Board wished it every success. There was ample room for both great services; and it was noteworthy that since the development of electrical competition, both the electricity and the gas undertakings in that district had increased their output. He hoped they would continue to prosper side by side. In 1894, when the Board took over the Company, it was fully realized that the undertaking was over-capitalized. They had bought an obsolete plant, and had had to renew the whole of it. In 1915 a new spiral gasholder was erected by Messrs. Dempster, and had greatly increased the storage capacity at the works. The vertical retort installation of 1912, opened in 1913 at Hebden Bridge, was, said Councillor Sutcliffe, the first of its kind. It worked so well that a second bed of verticals was erected, and put into use in July, 1915, and a third bed was completed and put into use in November, 1925—the bed which had been officially declared opened that day. Various other features of the works had been improved, including the new coal handling plant and improvements in condensers, governors, and a new boiler; and

the Board felt that they were in a position to cope with a considerable increase in output. Another point which had occupied the attention of the Board for a considerable period was the problem of tar and liquor storage; and they had had to spend money on greater tank capacity. The Board had a wide area of supply, involving some 60 miles of mains. They were supplying gas for 460 public lamps and 72 engines, and they had in use on the district 3600 gas cookers and wash-boilers.

Councillor H. SUTCLIFFE (Vice-Chairman of the Gas Board), proposing a toast to "The Contractors," expressed the Board's satisfaction with the Dempster-Toogood plant. Messrs. Dempster were a firm who, in erecting a plant, adapted themselves readily to local conditions and requirements; and if the local undertaking had any special ideas of its own, they were fully prepared to apply them as far as possible to the plant. Mr. Sutcliffe said he knew there were different opinions on the relative value of verticals and horizontals. At Hebden Bridge they had lived down all criticism, and were perfectly satisfied. When one realized that they could get 3000 c.ft. of gas more per ton of coal carbonized from these vertical retorts than they could from the old horizontals, it was obvious they could not be otherwise than satisfied. The first duty of a gas undertaking was to make good gas and sell it as cheaply as possible, and this could be done by Dempster-Toogood vertical retorts.

Mr. BROADHEAD said that the firm had been glad to carry out the work to the best of their ability and in a thorough manner. They aimed to give complete satisfaction, which was the only way to create and maintain the happy feeling which had prevailed between the Board and the contractors throughout this work. He noted with interest the steady increase in gas consumption in the district. He was only sorry it was not still greater, so that his firm would be coming along to put in a further installation. The firm of Robert Dempster & Sons, Ltd., were particularly grateful to the Hebden Bridge Board, and would always owe them a deep debt of gratitude for the opportunity the Board gave them in 1912 of trying out their new plant. They had since carried out contracts of various sizes—a good many of moderate dimensions, a number running into a hundred thousand pounds or so, and one for which the amount had exceeded a quarter of a million sterling. Mr. Broadhead mentioned that while vertical retort installations were the big contracts Messrs. Dempster had carried out at the Hebden Bridge Works, they had done a number of smaller jobs there during the past 34 years. Mr. Broadhead wished to compliment Hebden Bridge Gas Board on the possession of a keen and very capable Engineer in Mr. Nield, a man with whom it had been a great pleasure to be associated.

Mr. T. DUXBURY (Gas Engineer, Oldham) proposed "The Towns and Trade of Hebden Bridge and Mytholmroyd." He remarked that he began his association with the district about 24 years ago, when Mr. Wellens, one of his former pupils, was appointed Engineer there. He had continued the association with Hebden Bridge through Mr. Nield, who had been another of his pupils. In both those men Hebden Bridge had been very fortunate. He believed his own works at Oldham were the second to adopt Dempster-Toogood verticals. They came to Hebden Bridge, inspected the new plant, and very soon put in a similar plant, with slight modifications to suit local requirements. For the past four years they had got over 90 therms per ton of coal carbonized.

Councillor A. W. LATHAM, a member of the Gas Board, proposed "The Gas Engineer and the Clerk." He said that Mr. Nield was a capable Engineer who had the full confidence of the Board. In Mr. Sam Ogden they had a very capable Clerk to the Board, and one who was highly esteemed.

Mr. NIELD, in response, said there were one or two ways in which the Hebden Bridge gas undertaking was unusual. The visitors would have noticed that there was no gasholder on the works. The one holder was on land some 300 yds. away from the works, and the other was a mile and a quarter away at Mytholmroyd. This was because the restricted works site gave them no space for a holder. During the war, when all gas undertakings had to reduce, the consumers in exceptionally high districts continued to get a good light. Another point which seemed to him to be absolutely unique was that dull wet days did not bring the increased load experienced in gas undertakings generally. Instead, it brought a reduced load. For some time he was greatly puzzled by this, but eventually found that when there was a lot of rain, the river and streams became flooded, and some users of industrial gas engines in the district shut off their gas engines, and turned temporarily to water power. Another feature which was probably out of the common was the fact that, despite the industrial character of their locality, out of the make of 118 millions in the year 1925, the works had supplied roughly 3 million c.ft. per annum for egg incubators, and at a reduced price. Mr. Nield said that when he first came to Hebden Bridge he was much concerned as to whether the adoption of vertical retorts on the suggestion of his predecessor had been wise. Since then he had had the working of them, and to-day he had no hesitation in saying that the results had proved absolutely that the step was a correct one.

Mr. SAM OGDEN (Clerk to the Gas Board and the Hebden Bridge District Council) also responded. He said how greatly the Board appreciated the manner in which Messrs. Dempster had done their work. He never wished to meet a better commercial man, or one who was more willing to meet one in any point under dispute or question, than Mr. Broadhead.

Following the toast of "The Visitors," Mr. TOOGOOD, called upon by the Chairman, said the general public seemed blind to the developments of gas. In less than twenty years, he thought, all gas-works would double their output. This silent and strong growth was due to the cheapness of gas compared with electricity, and to the convenient way in which gas could be utilized. It had taken many years for the value of gas-works coke to be realized. Coke should be the standard domestic smokeless solid fuel.

INTERNATIONAL GAS EXHIBITION AT ANTWERP.

[By Our Own Correspondent.]

The official opening of the International Gas Exhibition to be held in Antwerp during the whole of this month took place on Saturday, May 1. The occasion was made one of some importance, and, in the commodious buildings and gardens of the "Harmonie," Chaussée de Malines, was favoured with fine weather, and proved a successful function. We are glad to congratulate our Belgian friends on the thoroughness of their arrangements, the excellent displays made, and the influential support obtained.

The Exhibition is under the high patronage of H.M. King Albert I., and an Honorary Committee of gentlemen holding important positions in the province and city of Antwerp, with whom are associated the Presidents of the Institutions of the Belgian, Dutch, French, Italian, and British Gas Engineers, the British Commercial Gas Association, and the General Managers of the Imperial Continental Gas Association's Works at Brussels and Antwerp.

The inauguration was one calculated to attract the attention of the Antwerp public. The Gas Company's band marched through the streets to the Exhibition grounds, and there played the national anthems of the countries represented. This was followed by the firing of guns as the signal of the start of the proceedings, which consisted of speeches by Mr. A. F. Hayman (the General Manager of the Antwerp Gas Undertaking), M. Arthur Wauters (Chief of the Cabinet of the Ministry of Industry and Works), and M. Lebon (representing the Burgomaster of Antwerp).

The function was well attended by representatives of the city, and among those present were, in addition to those named above, General de Posch (Commandant of the Province) and various gentlemen connected with the administration and public interests of Antwerp. The latter included M. Castelein (President of the Antwerp Chamber of Commerce), M. Beliard (President of the French Chamber of Commerce), and the following Consuls: MM. Leif Bogh (Norway), Tondeur (France), G. Galli (Italy), Salz (Spain), A. Rowley (Great Britain), and G. S. Messersmith (U.S.A.). The Presidents or representatives of Gas Institutions were Mr. F. W. Goodenough (Executive Chairman of the British Commercial Gas Association), Mr. C. S. Shapley, of Leeds, who, with Mr. Hayman, represented the British Institution of Gas Engineers, Dr. L. J. Terneden (President of the Dutch Gas Association), and M. J. de Brouwer (President of the Belgian Association).

Mr. Hayman welcomed the company, thanking them not merely for their presence, but for the support they were giving to the International Exhibition, which was the second to be held in Antwerp. He remarked that the Exhibition virtually coincided with the centenary of the Imperial Continental Gas Association, which had lighted Antwerp for 86 years. He then referred to the strides which the gas industry had made since the end of the eighteenth century, when, almost simultaneously in France, England, and Belgium, Lebon, Murdoch, and Minckelers had discovered that marvellous commodity called gas. He recalled the difficulties which had to be overcome by the pioneers in the industry when Clegg lighted Westminster Bridge with gas, and Minckelers, at Louvain, established the first gas main canalization. He remarked that work in connection with gas was not all lucrative, since Lebon died in want on a hospital bed in Paris, and Meeus ruined himself in attempting to instal a gas-works in Brussels. The change in the public acceptance of gas was indicated by the fact that when gas was introduced in Antwerp, houses were advertised for letting with the declaration that they were not lighted by gas, while to-day they could read notices of "Houses to let, with gas on all floors."

Mr. Hayman briefly remarked on the progress of the gas industry made in Antwerp, and indicated the present extent of gas usage by stating that there were now 15,000 public lamps, 130,000 consumers, and mains covering 1200 kilometres, which is the distance from the Belgian frontier across France to the Pyrenees. He pointed out that visitors would be able to see in the Exhibition the latest gas appliances, the character of which would convince them that gas was indispensable in many spheres of life. He then asked the delegate of the Ministry to open the Exhibition.

M. Arthur Wauters, of the Ministry of Industry and Works, stated that the Government could not remain indifferent to the Exhibition, because gas in Belgium occupied a prominent place. The speaker quoted figures of coal used, gas made, and residuals produced. He stated there were 58 Belgian gas-works, which used 800,000 to 900,000 tonnes (2204 lbs.) of coal per annum, made 300 million cubic metres (35·3 c.ft.) of gas,

400,000 to 500,000 tonnes of coke, 40,000 to 50,000 tonnes of tar, 9000 tonnes sulphate of ammonia, and employed 9000 workmen.

After referring to the developments which had taken place in the gas industry, and the difficulties encountered from time to time, he said that the Exhibition afforded a wonderful object lesson of perseverance and tenacity; and he congratulated the organizers on their work. He then declared the Exhibition officially open, and wished it every success.

It was gratifying to hear M. H. Lebon, representing the town administration, acknowledge the extent to which the gas industry had benefited the City of Antwerp.

The opening of the Exhibition was celebrated by a dinner given in the evening at the Gymnase, l'Avenue Isabelle, where there was a large and representative gathering. Mr. A. F. P. Hayman acted as Chairman, and was supported by Baron Georges Holvoet, Governor of the Province, General de Posch, M. Lebon and M. Junes (both City Administrators), M. Schonhens (Recorder of the Province of Antwerp), M. Ghyselinck (Town Clerk), M. O. Mavaut, of the Ministry of Works, M. de la Paule (General Manager of the Brussels Gas Undertaking), M. Fl. Coosemans and M. Eg. Van der Geten, who acted respectively as General Manager and Secretary of the Exhibition, Mr. H. W. Gandon (Engineer of the Antwerp Gas-Works), and many others.

After the Loyal Toast to King Albert and the Royal Family had been honoured, similar homage was paid to the Sovereigns of other countries represented.

Mr. Hayman welcomed the presence of Baron Holvoet and M. Lebon, who had shown considerable interest in the Exhibition and the work the gas industry was doing at Antwerp. He also expressed his appreciation of the presence of the numerous visitors, and concluded by toasting the guests.

Baron Holvoet made an able speech in which he congratulated the organizers of the International Exhibition, which demonstrated the progress made by the gas industry. He was particularly pleased that the foreign visitors were able to see how Antwerp could do things, and he thought that the Consuls of the countries represented would be able to take the Exhibition as an example, and induce their governments to participate in the Great World's Fair of 1930, which it was hoped would be worthy of the City. He concluded by expressing his good wishes for the success of the enterprise.

MM. de Brouwer, for Belgium, Terneden, for Holland, and Messrs. Goodenough and Shapley, for Great Britain, took the opportunity of adding their congratulations.

M. Fl. Coosemans, in his capacity as Chairman of the Executive Committee, thanked the exhibitors for the excellent displays which they had made, and trusted that the work achieved would end in results mutually beneficial.

At the end of the dinner M. Van der Geten invited the guests to accompany him to the Exhibition, to see the general lighting of the grounds and building. The function was decidedly successful. There was every reason to be pleased with the general lighting, which had been excellently carried out by Messrs. Wm. Sugg & Co., Ltd.

The visitors were most cordially treated, and expressions of appreciation were freely made.

M. Eg. Van der Geten had produced an excellent guide to the Exhibition, and included in this a bright and descriptive article on a "Century of Lighting" from the year 1824 to 1924, making at the same time some reference to preceding history. M. Wauters, during the course of his speech, had paid full tribute to this, stating that he had not seen one so informative and well written.

With this as a guide, and all stands and displays completed and ready for inspection, the visitors had every opportunity of passing an interesting and instructive time.

Unhappily for the present writer, the strike news from England necessitated a speedy return home immediately after Saturday's ceremonies, and scant opportunity was afforded for the close inspection intended. Sufficient, however, was seen to believe that present and prospective Belgium gas users had ample chance of knowing the extent to which gas could be used, and of examining the apparatus available for the purpose. The slogan in prominence on several pages of the guide —"Ceux qui visitent l'Exposition ont le conviction que le gaz est indispensable dans tous les domaines"—is expressive of M. Van der Geten's remarks that "thanks to the diversity of apparatus, and to the great variety of methods of utilization, gas is capable of responding to all needs," and his final statement that "the future still holds surprises for the gas using public."

The exhibitors obviously were mostly Belgian, but there were good displays by Dutch, French, and British firms. Among the latter were Messrs. Wm. Sugg & Co., Ltd., Radiation, Ltd., R. & A. Main, Ltd., Thomas Glover & Co., Ltd., Burt, Boulton, & Haywood, Ltd., and George Wilson (Gas Meters), Ltd., whose stands and exhibits were excellently arranged and were fully representative of British practice in domestic gas appliances. It was interesting to note the number of apparatus —as in the case of gas fires—on other stands, which were similar in style and appearance, whether based on like principles of design or not. One was surprised, perhaps, to find that asbestos and certain log types of gas fires are still offered for sale, and from observation in Belgium are in use in several places. Cooking appliances of all types were in evidence, and a very fair show of gas lighting lamps, burners, and fittings. One firm, in exhibiting a fine assortment of the latter, evidently had eyes for other business outlets, since they prominently advertised the fact that all the pendants, brackets, &c., shown could be provided also for electric lighting.

It was naturally gratifying to see that the very effective illumination of the main hall and of the grounds had been achieved by a British firm.

Among the many exhibits were model gas lighted and heated kitchen, nursery, dwelling, and other rooms arranged by the Imperial Continental Gas Association, who added a further attractive feature in a display of coal and its derivatives.

In addition to the various gas appliance exhibits, including demonstrations of biscuit and sweet manufacture by gas, there were stands showing materials used in distribution work, such as pipes and connections, taps, brass work, tools, gauges, and the like; analytical apparatus; refractory materials, &c.

The Exhibition as a whole reflects great credit on the organizers; and we should like to add our wishes for success to those expressed at the opening ceremony.

Electrical Plant for Gas-Works.

Gas engineers have long realized the utility of electrical equipment in gas-works; and the latest booklet published by the Electric Construction Company, Ltd., of Ingersoll House, Kingsway, W.C. 2, is of considerable interest. The publication, which is entitled "Modern Electrical Plant," commences by a brief account of the early days of the Company, whose business, by the way, dates back to 1882. Emphasis is given to the fact that the Company now confine themselves to the manufacture of machinery and switchgear. They have no other activities, and consequently are able to give customers specialist attention. With regard to generating plant, the firm manufacture all types of A.C. and D.C. machinery, with the single exception of generators for direct coupling to high-speed steam turbines. In the latter connection they are satisfied that—at any rate in sizes up to 2000 KW.—the geared turbo-generator has the advantage as regards both steam consumption and price. The arrangement permits the employment of a turbine of higher speed—and, therefore, greater efficiency—than can be used in the direct coupled type, where the speed is governed in A.C. plant by the periodicity of the driven machine, and in D.C. by the limitations of generator design. On the other hand, in geared sets the generator itself is of comparatively low speed, calling for none of the special features in design and manufacture which must be embodied in what is known as "turbine construction," and therefore possessing all the reliability of the slow speed machine. Several examples of the firm's manufactures are illustrated in the booklet; one of the photographs showing the starting-up of an "E.C.C." motor generator set in connection with the new carbonizing plant at Walsall. The publication concludes with a selection of useful notes, formulæ, &c., giving the method of determining the current consumption of motors on various systems, and other useful items.

Sulzer Coke Cooling Plant.

At the Forges et Aciéries de la Marine et d'Homécourt, at Homécourt, there is a Sulzer plant which serves for cooling the coke drawn from two batteries of horizontal chamber ovens, each battery comprising seventy ovens, and each oven producing about 7·6 tons of coke. The cooling plant consists of four units, three of which suffice for cooling the normal coke production of 900 tons in 24 hours, while the fourth serves as a stand-by. The containers in which the coke is cooled are erected opposite the discharge side of the ovens, and are on columns, thus allowing a free passage under them for trucks. The containers are charged by two platform hoists, connected with each other by a gangway. The coke withdrawn from the ovens falls directly into a car with sloping bottom and discharging door at the side. The car is drawn by a locomotive over a side track to one of the hoists, where it is raised to the gangway and emptied into one of the containers. The manœuvring of the coke car on the gangway is effected by means of a carrier truck with catchhooks, which is worked by an endless chain. Any one of the four units can be served from either of the two hoists, so that there is also a stand-by for the conveying plant, thus ensuring great reliability of working. Tests carried out on the plant have shown that with the sensible heat of the coke about 840 lbs. of steam at a pressure of 140 lbs. per sq. in. can be raised per ton of coke cooled. Steam can also be raised at 210 lbs. per sq. in. if required. The coke cooling plant at the Utrecht Gas-Works, which was put into service in 1925, can cool 325 tons of coke in 24 hours. At present it is being worked 16 hours daily, and 216 tons are being cooled. The steam raised is used for driving a 750-KW. extraction turbine. Steam is admitted to the turbine at a pressure of 215 lbs. per sq. in. and a temperature of 570° Fahr., and can be extracted at a pressure of 35 lbs. per sq. in.

THE SMOKELESS FUEL PROBLEM.

By A. PARKER, D.Sc., F.I.C., Research Chemist to the Joint Committee of the University of Leeds and the Institution of Gas Engineers.

The elimination of the smoke nuisance and the more efficient utilization of our coal supplies by improvements in present practice are now recognized as problems of paramount national importance; and there is no doubt that their satisfactory solution will become even more vital as time progresses. The evils resulting from the smoke pall which overhangs our industrial areas are well known. In the first instance, the production of smoke signifies the direct loss of valuable fuel. This direct loss, however, is of minor importance as compared with the detrimental effect on public health and the expense and inconvenience incurred by the action of dirt and acid fumes on plants, buildings, household decorations, and personal linen.

One phase of the subject—the production of solid smokeless fuel—has been considered in several valuable papers and discussions during the past few months. A symposium was held by the Chemical Engineering Group of the Society of Chemical Industry at their annual general meeting in Leeds in July last. Later, the winning essays of the Coke Competition organized by the "GAS JOURNAL" and made possible by the generosity of Sir Arthur Duckham were published; and as a direct result a further conference was held in Sheffield in November. A great deal of attention has thus been focussed on this subject, but the difficult problem of the elimination of the smoke nuisance must not be allowed to fall into the background until it has been satisfactorily solved.

As far as this nation is concerned, there appears to be no prospect, for many years to come, of coal being replaced as the cheapest and most important source of energy. The rising cost of coal and the gradual exhaustion of the more easily mined and richer seams therefore render it imperative that the most economical methods of utilization should be adopted.

During the year 1924, approximately 270 million tons of coal were mined, and of this amount about 90 million tons were exported. According to the report of the Secretary for Mines, the distribution of the remaining 180 million tons available for consumption in Great Britain may be represented by the following statement:

	Millions of Tons.	
Coke Ovens (metallurgical coke)—		
Total quantity	18·9	
Less equivalent of coke exported	2·7	
Net home consumption		16·2
Gas-Works—		
Total quantity	18·1	
Less equivalent of coke exported	1·4	
Net home consumption		16·7
Manufactured Fuel—		
Total quantity	1·1	
Less equivalent exported	1·0	
Net home consumption		0·1
Electricity generating stations		7·7
Railway companies (locomotives)		13·5
Coastwise vessels (bunkers)		1·3
Blast furnaces		1·5
Collieries (engine fuel)		16·6
Miners' coal		6·6
Domestic use, general manufactures, and all other purposes		100·3
Total		180·5

Of the total quantity consumed at home, about 40 million tons were used by gas-works, coke ovens, and producer gas plants. The remaining 140 million tons, of which almost all was consumed in the raw state, may be divided roughly into 100 million tons for raising steam and other industrial purposes, and 40 million tons (including miners' coal) for domestic use.

From the table showing the distribution of the coal consumed in Great Britain, it may be seen that the gas-works and coke ovens carbonize nearly 40 millions of tons of coal per annum for the purpose of manufacturing two valuable smokeless fuels —gas and coke; and at the same time the bye-products tar and ammonia are recovered. The main object of the coke oven is to produce coke possessing the special properties required by the metallurgical industry; whereas the chief aim of the gas industry has been to manufacture gas of the quality required for domestic and industrial purposes; and coke, as a secondary product, has not been given the attention it deserves. The possibility of producing coke with the qualities desirable in a solid smokeless fuel for domestic use is now being realized, and coke quality and structure are consequently being given much more consideration. The gas industry is based on sound scientific principles, and with its experience is well suited for the production of the smokeless fuels required to meet the needs of different consumers. The cost of the carbonization process must, however, be borne by the products obtained, with the result that the prices required have so far operated against gas and coke being universally employed in place of raw coal. In this connection, it must not be assumed that the highest possible efficiency either from a thermal standpoint or as regards cost has yet been attained; but the gas industry is alive to its responsibilities in this matter, and is making greater efforts every year to improve the technique and reduce the costs of the processes it employs. In addition to the highly trained research staffs employed by several of the larger gas undertakings, a large amount of co-operative research is being carried out under the guidance of a Joint Committee of the University of Leeds and the Institution of Gas Engineers; and the work of this Committee now includes a study of the influences of various factors in carbonization on the structure and properties of the coke produced.

The problem of smoke prevention is really one of determining how far it is practicable to utilize alternative methods of producing the heat and power at present generated by the 140 million tons of coal per annum consumed in the raw state. The greatest offender in smoke production is undoubtedly the domestic hearth, for the Meteorological Office Advisory Committee on Atmospheric Pollution has estimated that, though the consumption of raw coal in domestic appliances is less than half the amount consumed by industrial boilers, the smoke production is at least twice as much. In other words, one pound of coal consumed in the average domestic appliance causes more than four times the amount of atmospheric pollution produced by the same amount of coal burned under the average factory boiler; and there is no doubt that with more scientific control, the smoke production of the average factory chimney could be further reduced.

It has already been mentioned that approximately 100 millions of tons of coal per annum, or roughly half the total home consumption, are used in the raw state for raising steam and for other industrial purposes. The major portion of this amount is used for raising steam; and with the best appliances, over 70 p.ct. of the heat of the coal is recovered in the steam at the boiler—that is, without any allowance for losses in distribution to the points at which the steam may be required. Though this high efficiency can be attained, the performance of the average boiler is very much lower. There would thus appear ample scope for improvement as regards coal conservation. It is not easy, however, entirely to replace raw coal for boiler firing by smokeless fuels such as gas and coke without increasing the cost of steam production. For example, though gas-fired boilers operate with an efficiency of 80 p.ct. of the gross calorific value of the gas employed, the fuel cost is higher than with coal or coke, so that it is only in cases where convenience and cleanliness are important considerations, and savings can be effected in other directions (mainly with small installations) that gas firing is a practical proposition. Coke, in suitable form, is rather more efficient, from a thermal standpoint, than raw coal for steam raising purposes; but it must be remembered that many boiler installations use low-grade slacks obtainable at prices very much below those commanded by the coals ordinarily used in the carbonization industries. There are many instances where coke, either alone or with coal on the "Sandwich" system, is used with financial and other advantages; and these instances will probably increase in number. But, in general, the diminution in the smoke production of factory chimneys must be obtained by improvements in design and more scientific control. In this connection it must be pointed out that many boilers are operated constantly above their normal maximum capacity; and these are the chief industrial offenders in the matter of smoke nuisance.

The replacement of the raw coal consumed by the domestic hearth, by solid smokeless fuels or other smokeless forms of energy constitutes the most important section of the problem under consideration; for, as already stated, it has been shown that one pound of coal consumed in the average domestic appliance produces more than four times the amount of smoke emitted when the same amount of coal is burned under the average factory chimney. For the solution of this section of the problem, a number of schemes have been put forward. Nevertheless, for various reasons, alternative fuels have not yet been adopted to a degree great enough to cause a sufficient reduction in atmospheric pollution. The most important possible alternative forms of energy for household purposes are electricity, gas, and prepared solid fuel; and it is proposed to consider each from the point of view of cost and convenience as compared with raw coal.

The services required in the average household, and for which coal is largely used, are provision of warmth, heating of water, and cooking. It has been shown by Dr. Margaret Fishenden that the efficiency of the coal fire is approximately 25 p.ct., so that with coal at 50s. per ton and of a calorific value of 13,400 B.Th.U. per pound, or 300 therms per ton, the cost of one therm effectively employed in heating a room would be 8d. The corresponding efficiency of a modern gas fire may be taken as 60 p.ct., on which basis, assuming the price of gas to be 9d. per therm, the cost of one effective therm would be 15d. Electricity at 1½d. per unit would cost 36·6d. for the energy equivalent to one therm; and this would represent the relative cost of an electric fire. The thermal efficiency of coke consumed in the

ordinary domestic grate is approximately 30 p.ct. On this basis, and with coke at 40s. per ton and of such quality that the calorific value is equivalent to 280 therms per ton, one therm would be transmitted to the room at a cost of 5·7d. Closed coke stoves and coke boilers used in conjunction with hot water radiators operate with an efficiency of about 50 p.ct., so that the cost of one therm usefully employed, with coke at 40s. per ton, would be 3·4d. With coal at 50s. per ton, coke at 40s. per ton, gas at 9d. per therm, and electricity at 1¼d. per unit, the relative costs of continuous heating by the different methods would therefore be represented by the following table, in which the open coal fire is taken as unity:

Relative Costs of Fuel for Continuous Heating.

Coal in open grate	1·00
Coke " "	0·71
Coke in closed stove or boiler for radiators	0·43
Gas in open fire under flue	1·87
Electricity in any heater	4·57

From this table it may be seen that, under the conditions assumed, the cheapest method for continuous heating is to use coke in closed stoves or central heating boilers; and even in open grates coke costs less than coal. Continuous heating by gas fires costs approximately twice as much as coal in open grates, and electric heaters cost over four times as much. It must, however, be emphasized that the relative costs given in the table are for fuel only, and for continuous or long period heating; no account has been taken of the cost of lighting the fires in the cases of coal and coke, nor of the saving in labour which results from the greater convenience and cleanliness of the gas fire and electric heater. When intermittent heating for short periods only is required, the costs of the fuel employed in the cases of gas and electricity would not bear the same values relative to coal as those given in the table, since the ease of lighting up and shutting down the gas and electric heaters as required would then operate in their favour, and in many instances it would become as economical on fuel cost alone to use gas as to burn coal. In many households, the use of gas fires may make it possible to reduce labour charges, and these reductions may more than counterbalance the greater cost of gas as compared with coal or coke in open fires. In such instances it may prove a financial saving to use gas fires even in rooms which are occupied throughout the day; and in addition the greater cleanliness would reduce the costs of decorations, &c., as compared with coal fires.

For the provision of the hot water required for various household purposes, there is no doubt that the cheapest method, when a large supply must be available at any moment, is to use coke in an independent boiler, for though the thermal efficiency of the coke-fired boiler is probably not more than one half that of the gas-fired boiler, the fuel cost with coke at 40s. per ton is rather less than one half the cost of gas at 9d. per therm for the same amount of water heating. On the other hand, for occasional supplies, there are many instances where the cost of gas heating may be no more than with a coke-fired boiler, owing to the saving of fuel at those times when hot water is not required. Electricity at 1¼d. per unit is much more costly than gas for water heating.

With regard to cooking appliances, it is not easy to give reliable average figures to represent the efficiencies of different types of ovens; but from tests by Mr. A. H. Barker it appears that, thermally, gas ovens are so much more efficient than the ovens of coal ranges that for cooking alone gas is the cheaper, in addition to being the more convenient, fuel. Electric cookers are undoubtedly clean and convenient, but at the price of 1¼d. per unit they are more costly than gas. Coke may be satisfactorily used in place of coal for oven heating in the Yorkshire type of kitchen range, but according to Dr. Fishenden coke is less efficient than coal in ranges with top heated ovens.

The three distinct services required in the average household have now been discussed, and from the points brought forward it has been shown that the cheapest fuels for the provision of warmth and the heating of water are coal and coke, when continuous or whole-day use is necessary, but that for intermittent use for short periods gas appliances would in many cases prove as economical. For cooking, a gas oven is less costly in fuel than either a coal or a coke range. These general conclusions, however, are based on direct fuel costs only. The actual over-all costs may not stand even approximately in the same ratios as those given in the foregoing paragraphs, when the indirect savings in labour charges, cost of decorations, &c., which result from the greater convenience and cleanliness of gas and electricity are included. These considerations should therefore be taken into account when deciding on the best appliances to meet the requirements of any individual household.

With medium sized and moderately large houses, the best arrangement would probably be to instal a coke-fired boiler for the domestic hot water supply and for radiators in the halls and bathroom. The heating of the rooms might be by gas fires throughout, when this would enable a reduction in the cost of domestic help. If labour charges could not be materially reduced in this manner, then solid fuel fires would be employed in rooms occupied continuously or for long periods, and gas fires in rooms for intermittent use. In moderately small houses, a coke-fired boiler for domestic hot water supply is to be recommended, with solid fuel fires for rooms occupied for long periods, and gas fires for shorter periods. Gas would be used for cooking in all cases.

The schemes which have been suggested are for households in which both comfort and expense are taken into account; and it is on the score of expense that it has not been considered advisable to recommend the complete replacement of solid fuel by gas. Further, every household must have some means for the destruction of refuse, and a solid fuel fire is required for this purpose, though it is not necessary that it should be an open coal fire. A closed stove serves equally well.

In the small cottage, the most rigid economy must be practised; consequently one fire must usually serve for the provision of warmth, heating of water, and cooking, with perhaps a gas cooker for occasional winter and more frequent summer use. Gas for purposes other than cooking and the occasional heating of a wash boiler is too expensive to be generally adopted in this type of house.

The considerations which have just been put forward lead definitely to the conclusion that for a long time there is likely to be a big demand for solid fuel to meet the requirements of the open grate in most households. At present the demand is met almost entirely by raw coal, so that if the emission of smoke from the domestic chimney is to be abolished, it is essential that a satisfactory solid smokeless fuel should be found to replace coal.

The solid fuel destined to replace coal for domestic purposes, in addition to being smokeless, must possess the following properties:

(*a*) It must be easy to ignite.
(*b*) It must be free burning, so that it may be kept alight without the necessity for maintaining a large body of fuel.
(*c*) It must be reasonably low in ash and moisture.
(*d*) It must be sufficiently robust to withstand handling and transport without serious breakage.
(*e*) It must be marketable at a price about the same as that demanded for household coal.

The logical method of preparing a solid smokeless fuel would appear to be to distil the volatile or smoke producing constituents of coal by a process of carbonization in which the valuable products, gas, tar, and ammonia, are recovered. At first sight this might seem to be a comparatively simple problem. Nevertheless, no solid smokeless fuel fulfilling all the conditions enumerated has yet been produced; though many gas-works now supply graded coke which satisfies all the requirements with the exception of (*a*) and (*b*). In this connection, it must not be assumed that difficulty of ignition is an unavoidable characteristic of gas coke, for it must be remembered that in the past the gas industry has considered gas as the main product, and until recently the possibility of preparing coke to replace domestic coal has received little attention. Recent researches, however, have shown that there is every prospect of a smokeless fuel possessing all the desired properties being marketed by the gas industry.

Meanwhile very much more might be done in the direction of replacing domestic coal by coke; and as a result the emission of smoke into the atmosphere would be considerably reduced until the solid smokeless fuel approximating to the ideal is an established fact. In a recent letter to the "Yorkshire Post," Prof. J. B. Cohen, whose work in connection with smoke abatement is well known, pointed out that in his own house the solid fuel fires are started up in the morning with coal, but for the rest of the day coke only is used. In this manner smoke emission is prevented except during the period of lighting the fires.

Many attempts have been made to manufacture a solid smokeless fuel containing a comparatively high percentage of volatile matter, by the carbonization of coal at low temperatures; and, apparently, highly satisfactory products have been obtained as far as physical and chemical properties are concerned. But the costs of the processes have been so great that it has not been possible to establish any of them on a sound commercial basis.

The various processes which have been devised for the low-temperature carbonization of coal are too numerous to be considered in any detail in this paper. They may, however, roughly be classified according to the method of heating adopted. With externally heated retorts, of which the Coalite and Fuel Research Board systems are examples, the yields of the products per ton of coal treated are approximately 35 therms of gas of a high calorific value, 210 therms in the form of low-temperature coke, and 24 therms in the tar, no allowance being made in these figures for the fuel consumed in the process. In order to ensure a uniform coke and to carry out the carbonization in a reasonably short period, the coal is heated in thin layers, with the result that the over-all charges per ton of coal treated are high. Further, the low yield of gas, which in high-temperature carbonization commands a higher price per therm than that obtained for coke, necessitates a larger proportion of the cost of the process being borne by the low-temperature coke produced. With the object of reducing the time of carbonization, while at the same time ensuring a reasonably uniform product, a number of processes have been devised in which the heat required to carbonize the coal is supplied by hot gases passed through the charge. If this sensible heat is carried by a large volume of low-grade gas, then the resulting gaseous product is of necessity

low grade. An example of this type of system is the Maclaurin process, which is to undergo trials on a large scale in Glasgow. The results of these trials will be awaited with interest. The volume of gas produced by the process is stated to be approximately 27,000 c.ft. per ton, but its calorific value is only about 250 B.Th.U. per c.ft., so that financial success is largely dependent on finding an outlet for this low-grade gas at a satisfactory price.

In the high-temperature carbonization of coal by the processes ordinarily adopted in the gas industry, the retorts, which are of fireclay or siliceous material, are heated externally, and the heating flues are maintained at temperatures ranging between 1200° and 1400° C. The products obtained per ton of coal are approximately 75 therms of gas, coke equivalent to 190 therms, and tar equivalent to 20 therms. Allowing for the fuel required to heat the retorts, the yield of coke is reduced to 150 therms, so that the total heat content of the products available for sale is 245 therms, which represents an over-all efficiency of carbonization of about 81 p.ct. of the heat value of the coal employed. The coke usually contains from 2 p.ct. to 3 p.ct. of volatile matter. Owing partly to the low thermal conductivity of the material of which the retort is made, but largely on account of the low conductivity of the coal itself, the charge adjacent to the retort walls attains a temperature of about 900° C., and is fully carbonized before any marked decomposition of the coal in the centre of the charge has commenced. The exposure of the coke to high temperature for periods longer than necessary to complete carbonization, and the small amount of volatile matter, are both factors which operate in the direction of rendering the product difficult to ignite. The work of numerous investigators, however, has led definitely to the conclusion that these are not the only factors which exert an influence on the relative ignitibility, combustibility, and reactivity of coke. In fact, it appears possible to produce a coke with a low percentage of volatile matter, yet, owing to differences in physical structure, more reactive than another type of coke with a higher percentage of volatile matter. The factors which influence coke structure include the character of the coal carbonized, the state of division of the coal, the method, speed, and duration of heating, and the temperature of carbonization. The work of various investigators has shown that the character of the coal to be carbonized may be controlled by first grinding and then mixing coals of different coking properties with one another or with coke breeze in predetermined proportions. The main effects of efficient blending are more rapid heat penetration of the charge and the production of a harder and more easily combustible coke. The method, speed, and duration of heating are factors which are largely determined by the design of carbonization plant. With regard to the method of heating the charge of coal, the following paragraph, taken from the winning paper of the "Coke Production" section of the Coke Competition, published in the "GAS JOURNAL" in November last, is of interest:

> From the point of view of combustibility of the product, there would seem little doubt that internal heating by means of sensible heat should give a highly combustible material. The difficulty arises in the fact that large quantities of hot gas or superheated steam have to be led through the material being carbonized, in order to convey the heat necessary to carbonize the fuel. If this sensible heat is carried in low-grade gas, then the resulting gas from the internally heated carbonizing plant is of necessity low grade, and unsuitable for distribution from gas-works. If the gas which is the heating medium is of high grade, then it tends to become degraded by passage through the material undergoing carbonization. Therefore, from the point of view of gas-works practice, it is difficult to devise a process of carbonization depending entirely on internal heating by sensible heat.

With the object of obtaining the advantages of internal heating, but without the disadvantages mentioned in the paragraph just quoted, the author of the present paper had previously worked out a scheme in connection with which an application was lodged with the Patent Office early in October last. Broadly, the scheme devised consists in combining a water gas generator and a carbonization unit. The conditions of operation may be varied to suit requirements. The process, one of the objects of which is the manufacture of a solid smokeless fuel, cannot be discussed further in this paper. It is intended at a later date, however, to give a more detailed description and the results of calculations which have been made to determine the yields of the various products which should be obtained when operating a process of this kind under different conditions.

It is impossible in a brief review of the smokeless fuel problem to consider in detail any one of the factors, either technical or economic, which must be taken into account in attempts to solve the different sections of the problem. It has been shown, however, that as far as this country is concerned, a step in the right direction will have been made as soon as the commercial production, in large quantities, of a solid smokeless fuel to replace domestic coal has become an established fact. Many valuable researches have been carried out by investigators in the fields of low-temperature carbonization, high-temperature carbonization, and the production of furnace coke; and there is no doubt that the basic principles already elucidated will prove of value in the future. The study of the carbonization of coal is an immense and difficult subject, partly owing to the complex nature of coal substance, but largely on account of the fact that coals from different localities show considerable variations in their properties. The fringe of the subject has only just been touched. This paper, therefore, will have achieved its object if it serves to inspire more active interest in the study of the fundamental conditions of carbonization as regards the yields and qualities of the products obtained, and especially in connection with the nature of the coke produced. The physical and chemical methods of examination of coke, with a view to determining suitability for different purposes, also require further investigation. Among the physical methods of examination, reference might be made to the preparation of coke sections.

The examination of a lump of coke with the object of determining its texture is normally a difficult matter, if it be desired to obtain an idea as to the size and shape of the pores, the wall thickness, and the general condition of the specimen. Micro-sections, as ordinarily examined, are usually much too small, and it is necessary to examine a number of sections to obtain information as to the structural differences existing in different parts of one piece of coke. For this reason, hand sections are also examined, but in these sections the shaded air pores do not show up well against the coke skeleton.

With these defects in mind, Dr. Rose, of the Koppers Company, has developed an ingenious method for revealing the structure of the coke. Essentially, the method consists in filling in the pores and cracks of a plane section with a suitable white cement, and polishing the surface so obtained. The cement used is mainly plaster of paris. The method is now in use by the staff of the Joint Research Committee of the University of Leeds and the Institution of Gas Engineers.

A complete list of publications dealing with the many branches considered in this paper would almost constitute a volume in itself. It is believed, however, that the list given will prove useful in that the publications mentioned include references to many other papers.

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Novel Method of Clearing Tar from Main.

An unusual method employed by the Burlington Light and Power Company to remove a stoppage in one of their high-pressure mains (which was laid over twenty years ago, without any attention to grading) has been described by Mr. M. A. Hard, in the "U.G.I. Circle." The main supplied a township some three miles from the works; and when complaints of "no gas" came along, an immediate investigation was made. Ultimately a point was found at which the main was one-third full of solidified tar, which was so hard as to prevent penetration by a knife. About 700 ft. of main was obstructed; and as this portion was under a newly asphalted street, opening it would have caused dissatisfaction. Therefore the following plan was resorted to: A bank of A.C. transformers was set-up between the two points mentioned, and an electrical current of 400 amperes at 220 volts applied to the pipe, along with an air pressure of 80 lbs. per sq. in. from a portable compressor. In less than an hour, under this treatment, the riser at the lower end commenced to emit a string of tarry matter, which had evidently been warmed just enough to provide a sliding medium under this pressure. The pipe was then cut at this point, a section removed, and the same treatment applied. During several hours a total volume of solid matter equal to approximately one-third of the total volume of the 700 ft. section was discharged from the pipe at various intervals. Some pieces of solid matter 15 ft. in length, and equal in diameter to the size of the pipe, were blown out. It was concluded that the obstructed section was a trap, where there occurred a gradual accumulation of deposit. Without the simultaneous application of heat and pressure, it was doubted whether the main could have been cleared, except by working on much shorter sections, which it was desired to avoid for the reason already mentioned.

INSTITUTION OF ENGINEERS-IN-CHARGE.

Twenty-Sixth Annual Dinner.

There was a large and distinguished gathering at the twenty-sixth annual dinner of the Institution, which took place on Friday, April 30, in the Venetian Chamber of the Holborn Restaurant. The Institution is one of great and growing importance—embracing, as it does, a membership of nearly 500, and being able to boast of an increase of 10 p.ct. in the roll during the past twelve months. The attendance was a crowded one, and included the Lord Mayor and Sheriffs.

The chair was occupied by Engineer Vice-Admiral Sir George G. Goodwin, K.C.B., LL.D., M.Inst.Mech.E., M.Inst.N.A. (the President of the Institution); the Vice-Chairman being Mr. J. M. Dawson, who is Chairman of the Institution. Among those accepting invitations to be present were the Right Hon. the Lord Mayor, Sir Wm. R. Pryke; Mr. Alderman and Sheriff Chas. A. Batho; Mr. Sheriff Francis Agar, C.C.; Engineer Vice-Admiral Sir R. B. Dixon, K.C.B. (Engineer-in-Chief of the Fleet); Mr. Loughnan Pendred, M.Inst.Mech.E., M.I. and S.Inst. (Vice President); Mr. R. A. Chattock, M.Inst.E.E. (President of the Institution of Electrical Engineers); Mr. Frank Bailey, M.Inst.C.E. (Past President); Mr. T. Cooper, M.A. (Cantab.), M.Inst.C.E., M.Inst.Mech.E., M.Inst.E.E. (Past President); Sir Joseph Petavel, K.B.E., D.Sc., F.R.S. (Vice President); Mr. Asa Binns, M.Inst.C.E., M.Inst.Mech.E. (Chief Engineer to the Port of London Authority); Brig.-Gen. Magnus Mowat, C.B.E., M.Inst. Mech.E. (Secretary of the Institution of Mechanical Engineers); Lt.-Col. J. D. K. Restler, O.B.E., M.Inst.C.E., M.Inst. Mech.E., M.Inst.E.E. (Chief Mechanical and Electrical Engineer, Works and Building, Air Ministry); Mr. H. E. Stilgoe, M.Inst.C.E. (Chief Engineer to the Metropolitan Water Board); and Mr. Wm. McClelland, C.B., O.B.E., M.Inst.E.E. (Director of Electrical Engineering to the Admiralty).

Following upon the Loyal Toasts, the President said they were to have had with them that evening Mr. William Reavell, the President of the Institution of Mechanical Engineers, and Mr. E. A. Sandford Fawcett, the Chief Engineering Inspector to the Ministry of Health, but these gentlemen had been prevented from coming by reasons of health.

Mr. Loughnan Pendred, proposing "The Lord Mayor, the Sheriffs, and the Corporation of the City of London," said they were enjoying the singular honour that evening of having the company at dinner of the Lord Mayor of London and the Sheriffs. It was sixteen years since they last had that honour. One reason why he considered it particularly appropriate that they should be honoured by the presence of the Lord Mayor was because he thought theirs was the only Engineering Institution of its kind in the City of London. It had almost from its beginning been an affiliated Association of St. Bride's Institute.

They ought on such an occasion as this to record the splendid work which the City Guilds had done in the education of the young engineers. All of those present knew the magnificent Central Institution in Exhibition Road, South Kensington; and it might interest them to be told that the proportion of the cost of educating students in that Institution which was provided by the fees was only one-half of the total cost. That was to say, the City Guilds, by their endowments and grants, had to provide one-half of the cost of the education of all the engineers who studied there. The Guilds had done an enormous amount to improve the status of engineering. The great City of London was the financial head, not only of this country, but of the Empire. Now, probably it had been observed that money was less easy to find for engineering industries in this country than in some others. If the Lord Mayor could do anything to encourage the flow of money towards engineering, he would really serve them well. However, he was glad to say there was already a silver lining showing to the cloud; and if engineering received the encouragement it deserved, and the financial help it needed, before long they would see the engineering industry once more in its proper place among the great industries of this country.

The Lord Mayor, in response, said he was indeed proud to occupy the position of Mayor of the greatest city in the world. The Lord Mayor had many privileges and many opportunities of doing good; and if the work was somewhat onerous, it was always pleasant. There was in it an element of service to one's friends, neighbours, and citizens. In the execution of this work they were all very much indebted to the engineers, and to the engineering profession. They always felt they were in safe hands when matters came to the front which required the assistance of members of that profession.

Sir Robert B. Dixon, proposing the toast of "The Institution," remarked that the Institution of Engineers-in-Charge was well over a quarter-of-a-century old; and he was glad to see that it was in a robust state of health. Its objects, so far as he understood, were to cater for the engineer, and his ambitions and aspirations. He had been very much struck with the energy displayed by the Executive, with the standard of the papers presented at the meetings and of the discussions, and with the "Journal." He felt, in fact, that it was very difficult for any engineer-in-charge who wished to keep abreast of the times not to be a member of the Institution.

The President, in reply, said he was sure he was voicing the thought of every member of the Institution in saying they felt very grateful indeed to Sir Robert Dixon for the very kind way in which he had proposed the toast, and the encouraging words which he had used in his speech. They were also grateful to the distinguished company who were with them that night for so cordially receiving it. He had often been asked who were the engineers-in-charge; and sometimes different interpretations were put upon the term. But really the name spoke for itself. They were engineers in charge of important stations; and in order to fill these positions properly, the Institution felt they should be fully competent men. They took steps to ensure, before they were admitted to membership of the Institution, that they were really engineers-in-charge. One condition was that they must have proceeded through a regular and complete course of training in an approved engineering workshop. This was an indispensable condition of qualification for membership of the Institution. It was a very important condition; and those who constituted what he might call the Committee of Membership were very insistent that it should be complied with. This was not only of benefit to the Institution, but it was a national benefit. It had been said that this country was losing ground compared with other nations in certain engineering respects; that not sufficient machinery was adopted here, and that it was not scrapped as readily as it should be. This might be so in some directions; but the outstanding feature of the engineering of this country had been the substantial and good character of the heavier type of machinery. In that class of machinery, this country stood pre-eminent; and this was a fact which he thought would do a great deal to restore the industry to its proper place when other circumstances attending the present depression had passed away. The Institution realized, of course, that it had to keep pace with the march of knowledge. If the members did not do this, all the skill in the world would not bring them through. They must adapt themselves to the times in which they lived. The Institution therefore strove to keep in touch with the progress of science; and in this respect he thought they were helped a great deal by the parent Institutions. Another matter to which he would like to refer was the attempts which were being made—they were not fully matured yet—to establish a Student or Junior Section of the Institution. This was one of the principal functions of every Institution, including their own. The heritage of every junior was the accumulated knowledge and experience of the past. This of right belonged to the young men; and it was the duty of them all to see that they passed on as much of what they knew, and of what experience had proved to them, as they possibly could to those who were coming after. He hoped, therefore, that the efforts which were being made to establish such a section would be continued until success was reached.

"Our Guests and Friends" was submitted by Mr. W. Edwards, who said they had with them a number of gentlemen who occupied like positions to the members of the Institution, but who had not yet seen their way clear (though he was sure many of them were eligible) to become members. While much regretting that Mr. William Reavell was unable to be present to respond to the toast, as had been intended, he had great pleasure in coupling with it the name of Mr. R. A. Chattock, the President of the Institution of Electrical Engineers.

Mr. R. A. Chattock, responding, said it seemed to him that the present was an age of Institutions. There were no less than three Institutions catering for Engineers-in-Charge; and it did appear to him that if these bodies could be amalgamated it would strengthen the hands of the young engineers who were coming on, and make their position in the engineering world very much stronger. He would like to put the suggestion forward that unity was strength, and that it would be to the advantage to amalgamate these three Institutions, and make one very strong body. As they, of course, knew, there was an Electricity Bill before Parliament at the present time; and in the electrical world it was felt, among the junior engineers and the engineers-in-charge of the electricity stations, that it was quite possible their jobs might disappear. He could understand their anxiety in this matter; but the industry was growing so fast, and there were so many outlets in connection with the distribution of electricity all over the country, that they need not fear their jobs would be done away with.

Mr. J. M. Dawson proposed "Our President," and, on behalf of the members generally, the Council, and himself, expressed their deep sense of gratitude to Sir George Goodwin for the ready help and kindly assistance he had given to them during his year of office.

The President, in reply, said that for anything that he had been able to do, thanks were due to the officers of the Institution. The Hon. Secretary (Captain Penn) had given him a great deal of information from time to time. He congratulated the Institution on its success, and trusted that this success would be maintained. Reference had been made in the course of the evening to the growth of the Institution. The Secretary had recently told him that there were to be signed about 50 admission certificates for new members. The membership at present was nearly 500; so that 10 p.ct. had been added in one year, which was very gratifying.

Mr. Arthur Llewellyn Lloyd, of Atlas Works, Spring Hill, Birmingham, and of Catton Lodge, Leamington, Chairman of Messrs. Piggott & Co., Ltd., left £73,273.

We learn that the Società Romana del Gas has changed its title to Societá Elettricità e Gas di Roma. The address of the Company will still be Via Poli 14, Rome.

MIDLAND JUNIOR GAS ASSOCIATION.

The Annual General Meeting of the Association was held at the Council House, Birmingham, on Thursday, April 29. Mr. J. H. GEE, B.Sc., presided.

On the motion of Mr. C. F. DAKIN, the meeting adopted the annual report, which recorded that the membership of the Association had reached 237, including 21 honorary members.

With regard to the statement of the Treasurer (Mr. G. W. Smith), it was pointed out that the financial position of the Association was much more satisfactory than twelve months ago. Mr. W. F. Timbrell (the Hon. Auditor) said in a report that, as a result of the increased income, it had been possible to clear the balance owing for "Joint Transactions," which should have been included in the accounts for 1924-25, and also to hold in reserve an amount of £38 in respect of the liability incurred by reason of this item during the past session. In addition, there was a balance of income over expenditure amounting to £7 11s. 6d. as a result of the year's working. There was no outstanding liability against this balance.

The balance-sheet was adopted.

It was announced that the Council had appointed Mr. F. Caudwell, of the Distribution Department of the Shrewsbury Gas Light and Coke Company, as Junior Vice-President. Mr. C. F. Tooby, of the Foleshill Works, Coventry, the Senior Vice-President, will automatically become President next year. Messrs. McNaughton (Wolverhampton) and H. Percy (Birmingham) were appointed to vacancies on the Council.

A vote of thanks was passed to the officers of the Association, on the motion of Mr. A. KENDRICK (Birmingham), and tribute was paid by Mr. H. R. HEMS (who becomes the Senior Vice-President) to the splendid service rendered by Mr. W. L. S. Spinks (Hon. Secretary) and Mr. G. W. Smith (Hon. Treasurer), both of whom were re-elected. The CHAIRMAN also made warm acknowledgment of the honorary secretarial work, efficiently done over a period of five sessions, by Mr. Hems.

SOME ASPECTS OF SMOKE ABATEMENT.

Mr. C. ELLIOTT, B.Sc. (Honorary Secretary of the Smoke Abatement League of Great Britain), read a paper, in the course of which he said that non-industrial smoke can conveniently be considered under two headings—(*a*) offices, hotels, clubs, and the like; (*b*) dwelling houses. For new offices, &c., the recommendation of Lord Newton's Committee is surely excellent, and would amply meet the case. It reads: "That local authorities should be empowered to make by-laws requiring the provision of smokeless heating arrangements in new buildings other than private dwelling-houses, such, for example, as hotels, clubs, offices, and the like." For existing premises it is impossible that repressive powers will ever be granted; and only voluntary changes can be expected, which could be expedited by the pressure of public opinion and other means. The problem of purely domestic smoke is indeed a difficult one. For new houses the recommendation of Lord Newton's Committee is again excellent. It proposes that no housing scheme should be sanctioned unless provision is made as far as practicable for smokeless methods. For old houses we must rely on education.

Governments have a playful habit of appointing Departmental Committees and asking for their recommendations; but they are apt to do something quite different when the final reports are available. I suppose that the recent acceptance of the Coal Commission Report is unique. The report of Lord Newton's Committee is not only out of print, but to a great extent out of mind. One recommendation was that the Government should encourage the co-ordination and extension of research into domestic heating generally. This is being done in a truly excellent manner, but only on a small scale, by the Department of Scientific and Industrial Research; but if, as is claimed, non-industrial smoke is such a seriously large factor in atmospheric pollution, the work should be vastly increased and a much larger grant made for the purpose. In view of the difficulties experienced by the average person in determining the best type of apparatus for any particular case, the Smoke Abatement League, at its Buxton Conference last year, put forward the suggestion made by Mr. R. H. Clayton that there should be, in a few of the larger towns of this country, Heating and Ventilating Departments. These would be run on a regional basis, and would work in co-ordination with the Department of Scientific and Industrial Research. Different phases of this big subject could be studied at the various centres, and in addition all approved types of appliances could be inspected actually in use in suitable showrooms. Here the householder would have the advantage of free expert advice. This follows the Departmental Committee's report, and is certainly practical education, for naturally the abatement of smoke could be preached discreetly.

The matter of ventilation is too often disregarded, for it would be inadvisable to cleanse the outside air if that inside is stagnant and impure. The open fire is an excellent scavenger; and in spite of the labour, dirt, and smoke associated with it, I think that it is going to be the last heating appliance given up by the British public. It would be a bad policy to insist too strongly on the abolition of the open fire and the substitution of alternatives. It would be preferable to concentrate on cooking and hot water, which lend themselves admirably to modern methods. Here the gas industry with its two smokeless fuels has a colossal field; and from all accounts things are moving pretty fast. Electricity for cooking has equal opportunities, though it cannot yet satisfy where hot water is concerned. The immediate solution for the problem of the open fire is a smokeless fuel which will light easily. We are still awaiting the commercial production of this new fuel, though the Glasgow plant is now in operation, and another plant in Lancashire will soon be starting work. If the fuel can be sold at a reasonable price, it will solve the great problem of the poor man's cottage. Vertical retort coke is dry, gives a radiant fire, but, I believe, is not yet available in sufficient quantities.

The education of public opinion is the really important factor in the work of cleansing the skies. Until the public are thoroughly aroused, demand smoke abatement, and show continued interest in it, permanent improvement will be difficult. Smoke abatement is not a matter that can be settled overnight, and then left to take care of itself, but is something which must be watched year in and year out, if high standards are to be maintained. I believe that the propagandist methods adopted do not carry sufficient conviction with them. I am now more or less convinced that neither the industrialist nor the average person is going to make radical changes simply to avoid smoke. I believe that there is too much talk of tons of soot per square mile and the like—matters which convey nothing to most people. I suggest that we come down to earth, and talk practical politics—efficiency, economy, and comfort—that we introduce the subject through the daily lives and interests of the people whatever their rank in life, and, finally, that we give that filthy term "smoke abatement" a rest, or endeavour to find another one which will act as a key to open the door leading to pure air and sunlight.

Discussion.

The CHAIRMAN, in moving a vote of thanks to the lecturer, said it appeared clear that if much progress were to be made in the matter of smoke abatement, there must be research, and yet more research.

Mr. R. J. ROGERS observed that a great deal of propaganda work had been done in Birmingham through the Gas Department. No one liked to be forced to do anything. The British manufacturer was, in the main, reasonable; and if it could be proved that he could save money by a certain course of action, he was usually prepared to follow that course. If the policy of pointing out what could be saved were emphasized more than had been done, they would see less smoke from the large factory chimneys. With regard to the term "non-industrial smoke," he was not certain that its adoption would carry the ideas and ideals of the League so far as they would be carried if the word "domestic" was still kept in. If something else were required beside "domestic," then he suggested that the words "domestic and office" be used rather than "non-industrial" smoke. In Lord Newton's report there were some excellent and practical recommendations which could have been adopted by local authorities with benefit to the community, and also in the direction of the cause of smoke abatement generally. For instance, it was suggested that in new houses arrangements should be made for the use of smokeless fuel. Nothing, so far as he knew, had been done in this respect by local authorities; and the only gain secured in this direction was that obtained through the instrumentality of gas undertakings, by putting certain inducements before builders to instal gas heating, and therefore prevent the emission of smoke. He had had the privilege of giving evidence before Lord Newton's Committee, chiefly with regard to the provision they proposed to make for new houses. They probably knew that in almost all of the Corporation houses built in Birmingham since the war provision had been made for the use of gas fires in the bedrooms and in the parlour. Their view was that, even if the consumer could not afford to pay for gas at present prices, the time would come when the gas heating of rooms would be more common than it was to-day. But even now they could not complain in the gas industry at the progress that was being made. These facilities for using smokeless fuel were, however, the result of the individual efforts of various gas undertakings. If sane legislation were passed, he was quite certain that a great deal more could be done, with advantage to the community, in the way of economic heating in the homes, and with a consequent lessened amount of smoke in the air.

Southern Association's Visit to Bristol.

We have been asked specially to call the attention of the members of the Southern Association to the new fixture for the visit to Bristol, which is the home of the President, Mr. R. Robertson. The day now arranged is Friday, June 18; and while the Committee realize that this date will probably not be so convenient to some of the members as the one previously selected, they sincerely hope that every member who possibly can do so will be present to give the President and the Committee their support.

REGISTER OF PATENTS.

Water Gas Making.—242,237.

Humphreys & Glasgow, Ltd., of Victoria Street, S.W. 1, Assignees of C. S. Chrisman, of West Chester (Penn.).

No. 20,816; Aug. 19, 1925. Convention date, Oct. 31, 1924.

The principal object of this invention is to effect economy in the manufacture of carburetted water gas, more especially in respect to the consumption not only of oil but also of generator fuel. This is accomplished by keeping the temperature of the active oil vaporizing or carburetting surface not only high but also substantially uniform, and by reducing the quantity of heat extracted from the apparatus and lost or wasted in the operation of cooling or purifying the carburetted water gas after it leaves the apparatus. Less heat is lost, and economy of fuel effected, because the down-run water gas, while cool, is led away from the apparatus and is not reheated for carburation, and because heat may be extracted from the up-run water gas, after it has been carburetted, and utilized in heat exchange at the outlet end of the set. Thus there is available for use heat which otherwise would be imparted to the down-run water gas for carburetting and fixing it, and other heat which would be carried off with the up-run carburetted water gas and lost in its purification.

The temperature of the active carburetting surface is kept high and substantially uniform, and an economy of oil consumption is effected by subjecting that active surface to heat and heat exchange only with the blast gas combustion and products of combustion, and with the up-run water gas, while hot. Blast heat generated in excess of that required for water gas making and up-run water gas carburation may be used for heat exchange for pre-heating air blast, or generating or superheating steam in some part of the apparatus; but in no case is steam permitted to extract heat from the active carburetting surface.

Low-temperature steam may be introduced to the top of the fuel bed, and it will be superheated, before it reaches the zone of decomposition, by heat stored in the fuel at the upper part of the fuel bed during preceding blasting. High-temperature steam may be introduced to the top of the fuel bed provided that such steam has not been permitted to extract heat from the active carburetting surface. It is an advantage of the invention that the flow of gas during down-steaming may be controlled at a point where the down-run gases are comparatively cool because led from the bottom of the generator; and the up-run gas may also be controlled at a point beyond where it has been deprived of its heat in heat recovery devices on the outlet side of the active carburetting surface.

The invention is further explained in connection with drawings; but we refer readers to the specification and to several recent allusions in the "Journal" to the Chrisman cycle.

Coking Retort Ovens.—No. 246,500.

Koppers Company, of Pittsburg, Assignees of J. Van Ackeren, of Pittsburg.

No. 1927; Oct. 29, 1924. Convention date, Jan. 4, 1924.

The present invention consists in providing vertical retort apparatus of the kind referred to in patent No. 201,130 [see "Journal," Vol. 166, p. 908], with fuel gas and preheated air supplies for maintaining flame substantially throughout the length of the combustion flues during the inflow periods, and in which groups comprising half of the combustion flues operate for inflow while the other half concurrently operate for outflow, the waste gases from the former groups being conveyed into the latter groups by, *inter alia*, ducts extending round the ends of the retorts.

The invention thus embodies cross-around ducts in a flue system that is different structurally and functionally from that of the battery described in the prior specification. The cross-around ducts are traversed by waste gases in every working period, and carry the entire volume of heating gas flow instead of only a portion thereof.

The fuel gas supply may be either of a rich gas—for example, the gas of distillation of the apparatus itself—or water gas, with regenerative preheating only of the air of combustion, or may be of a lean gas such as producer gas or blast furnace gas, with regenerative preheating of both lean gas and the air of combustion. If desired, the apparatus may be equipped with both these fuel gas supplies. To lengthen the flame where rich gas is employed, the apparatus may be provided with means for admitting a gaseous diluent into the flame flues along with the air of combustion.

Fuel Distillation.—No. 249,236.

Merz & McLellan, of Victoria Street, S.W. 1, and Riley, W. A., of Low Fell.

No. 31,213; Dec. 30, 1924.

This invention, relating to a low-temperature fuel distillation process, has for its object to provide that the heat in the retort containing the fuel undergoing distillation shall be augmented by the air forming a constituent part of the distilling medium.

According to a primary feature of the invention the distilling medium for the fuel comprises an admixture of (*a*) hot products of combustion, (*b*) steam which is preferably regulatable in quantity and which may be superheated by direct admixture with the combustion products, and (*c*) air, also regulatable in quantity. The process is characterized in that the amount of air introduced only provides such oxygen as is necessary to support the limited degree of combustion of the fuel for the purpose set forth in patent No. 223,387 [see "Journal," Vol. 168, p. 664.] Preferably the air is admitted to the mixture of steam and combustion products before it enters the retort.

Another feature of the invention is that the steam is introduced through a jet, and the energy of steam issuing therefrom is utilized to propel the distilling medium into the retort.

The specification gives further details of the process, and describes a form of apparatus. The latter is summarized in the following claim: In combination, a retort, a combustion chamber, and a steam-injector nozzle within it, or within a conduit which leads from the chamber to the retort, whereby steam admitted to the nozzle not only is admixed with the combustion products to regulate or to assist in regulating the admixture of the distilling medium supplied to a retort containing the carbonizable material, but also serves to propel the said medium into or towards the retort, with or without means (for example, air inlets opening directly into the combustion chamber) to admix the air with the distilling medium before it enters the retort.

Meters.—No. 249,203.

Hansford, J., of Enfield.

No. 30,379; Dec. 17, 1924.

The object of this invention is to prevent the diminution of speed of the bellows of a meter as they reach the end of their strokes, since in this position the valves to the gas chamber and bellows are closed. The speed of the meter being thus accelerated allows the size of meter required for a given number of lights to be considerably reduced; without largely increasing the number of parts, the cost of a meter is substantially reduced.

This is effected by a supplementary supply of gas to the bellows or the gas chamber as the admission valve closes; slots or ports being provided for the purpose.

Burners for Singeing.—No. 249,454.

Turner, E., of Manchester.

No. 1281; Aug. 4, 1925.

This invention relates to gas burners for fabric singeing and other purposes; the main object being to provide an improved form of burner giving a stable oxidizing flame and one that will operate in any position.

The patentee claims: A gas burner for flame singeing and other purposes comprising an outer elongated body part formed with a longitudinally disposed flanged slot in which is disposed edgewise a series of strips of metal with spaces between to constitute the burner proper, in combination with an internal distribution chamber adapted to project streams of combustible mixture on to the blank wall of the outer casing; burners as claimed in Claim 1 wherein provision is made to admit air at each end of the burner body and wherein adjustable members corresponding in shape to the cross-sectional shape of the interior of the body are provided to define the ends of the flame.

Hydraulic Mains.—No. 249,620.

Toogood, H. J., and Dempster, R., & Sons, Ltd., both of Elland.

No. 567; Jan. 8, 1925.

This invention has for its chief object to introduce means which will, in a semi-automatic manner, effectually safeguard the seal in the hydraulic main while tar is run off from the tar tower, and also give a flush or re-flush through all the mains and over the whole floor area of the hydraulic main.

According to the invention, a flushing tank for ammoniacal liquor placed at a higher level than the tar tower is connected with the hydraulic main by a flushing valve, which is arranged to be operated in conjunction with a tar run-off from a common position at the bottom of the tar tower, to raise the level of the seal in the hydraulic main and tar tower before opening the tar run-off valve.

The flushing tank is provided with an overflow pipe which extends more or less along the hydraulic main, and is provided with a series of drip pipes, which visibly deliver water to the hydraulic main, and with a fall pipe which terminates in proximity to the tar run-off valve and is there provided with an indicating cock.

Combined Tank Stiffeners and Carriage Supports. No. 250,157.

Dempster, R. & J., Ltd., Scott, J. W., and Sheeran, A. J., all of Manchester.

No. 4220; Feb. 15, 1926.

The invention, relating to the tanks of spiral-guided gasholders, has for its object to provide stiffening means and carriage supports in combination; the former, for the most part, being situated within the tank.

The stiffening means are preferably used in addition to the ordinary stiffeners external of the tank, and are chiefly in proximity to the various roller carriages for strengthening the top curb of the tank.

The patentees say that not only is the stiffening effect greatly increased, both as regards the top curb and the plates throughout the depth of the tank as a whole, but the possibility of rusting as between the stiffeners and plates is largely rendered non-existent.

Channel sections are employed.

MISCELLANEOUS NEWS.

INSTITUTION OF GAS ENGINEERS EXAMINATIONS.

Gas Engineering and Gas Supply.

Below are the questions set in the examinations in Gas Engineering and Gas Supply which were held on May 1 under the Education Scheme of the Institution of Gas Engineers. The Examiners were, for Gas Engineering, Messrs. H. D. Madden, M.Inst.C.E. (Cardiff), W. J. Smith, B.Sc. (Bolton), and J. Stanley Thorman (London); and for Gas Supply, Messrs. S. B. Chandler, A.M.Inst.Mech.E. (Tottenham), George Keillor (Greenock), Stephen Lacey, B.Sc. (London), and A. B. Roxburgh (Newcastle-on-Tyne).

GAS ENGINEERING.

ORDINARY GRADE.

From 2 to 5 p.m.

Sketches can be adopted to obviate long and involved statements. The general neatness of the paper, including that of the sketches, and also lucidity of expression, will be taken into consideration in assessing marks.

(Eight questions set; six only to be attempted.)

1. Sketch a cross-section of the arrangements of mouthpiece, ascension and dip pipes, and hydraulic main for a horizontal retort, and include a section of the fireclay and of retort to show the method of fastening the flange of the mouthpiece to it.

2. Sketch a cross-section of a regenerator producer, showing waste gas and secondary air flues, and combustion chamber. (No retorts need be shown.) Indicate each, and also mark in the chemical reactions that occur.

3. Sketch a cross-section of an exhauster, and briefly describe the effects of (*a*) over-pulling and (*b*) under-pulling on the yield and nature of the gas.

4. Describe the process of washing and scrubbing gas. Give reasons for this process and the chemical reactions that occur therein.

5. Sketch a cross-section of a purifier, showing the following points: (1) Position of inlet and outlet pipes. (2) How the purifying material is held in position. (3) The method of making the cover gas-tight when the box is put into action.

6. Sketch and describe an apparatus for the testing of spent oxide of iron, stating what percentage of sulphur you would consider the material to contain when fully charged.

7. Describe briefly the functions of: (*a*) The station meter (and indicate the points to be observed to ensure accurate registration). (*b*) The station governor.

8. Sketch outline of a simple carburetted water gas plant (generator, carburettor, and superheater), showing essential features, and explain the method of the cycle of operation of such a plant.

HIGHER GRADE.

Part I., from 2 to 5 p.m.

(Five questions set; four only to be attempted.)

1. Sketch, for explanatory purposes, a cross-section of a horizontal setting, showing the producer, secondary air and waste gas flues, and combustion chamber (retorts not to be shown), and indicate thereon the chemical actions occurring and the temperatures you would expect to find in general practice.

2. Sketch and describe an apparatus for the analysis of producer and waste gases, and give approximate analysis of the exit flue gases from a regenerative setting of retorts.

3. What are the objects of condensation? Discuss this broadly, describing what physical conditions occur from hydraulic main to outlet of condensers.

4. Sketch the detail of gas washing method employed in a Livesey washer, and briefly record the use and value of this apparatus.

5. How would you ascertain the ounce strength of ammoniacal liquor? Explain what is meant by ounce strength.

Part II., from 6 to 9 p.m.

(Five questions set; four only to be attempted.)

6. Sketch cross-section of a water-lute purifier, showing inlet and outlet pipes and two deep layers of oxide. Give chemical formulæ for the revivification of sulphided oxide of iron.

7. Sketch general elevation and arrangement of a carburetted water gas plant—generator, carburettor, and superheater only—and explain the general working principle of such a plant.

8. Describe the process of the manufacture of ordinary sulphate of ammonia from ammoniacal liquor. State how many pounds of sulphate you would expect to obtain per ton of coal carbonized. Briefly describe the influence of differing methods of carbonization on the production of ammonia.

9. Sketch a double-cone equilibrium station governor, and briefly explain the uses of this apparatus.

10. Discuss the necessity for testing town gas for specific gravity, calorific value, and composition.

DIPLOMA.

Part I., from 2 to 5 p.m.

(Five questions set; four only to be attempted.)

1. Compare Derbyshire, Yorkshire, and Durham coals, and state, with your reasons, which you would select for horizontal, vertical, and inclined retorts, assuming the cost of each coal delivered into your works to be the same. Compare the quality of coke from each. State what conditions as to quality you would specify in selecting any of these classes of coals. Discuss the effect of varying percentage of oxygen in coals.

2. State what amount of steaming, in a typical vertical installation (expressed in percentage by weight of steam of coals carbonized) will give the maximum number of therms per 24 hours per retort described, the calorific value, and the analysis of the gas. State the amount of coke per ton of coal carbonized that would be gasified to water gas under such steaming conditions.

3. Give the analysis of the producer gas and the depth of fuel necessary in a well-designed producer for a horizontal setting. Discuss the grate area you would recommend for such a setting, to carbonize 10 tons of coal per 24 hours. Describe and give a sketch of the type of grate recommended, and the analysis of waste gases from the setting.

4. What methods would you recommend to be adopted to improve the value of coke made on a works, with a view to developing fields for its wider use, and meeting the varying needs of coke users?

5. Describe, with sketches, the various methods you would adopt in providing foundations for a heavy building, stating the sub-soil you have in mind. What test would you apply to a pile to carry 2 tons per sq. ft.?

Part II., from 6 to 9 p.m.

(Five questions set; four only to be attempted.)

6. State the temperature and the CO_2 content of the waste gases at the inlet and outlet of the regenerator of a modern horizontal setting, assuming a combustion chamber temperature of 1350° C. Explain in detail the extent of, and the reason for, the drop in temperature of waste gases passing through the regenerator of a horizontal setting, indicating the heat conductivity of the material used in its construction, and compare the volume of waste gases and the secondary air. Assuming there was a demand on a works for all steam (or power from steam) that could be raised by passing the waste gases through waste-heat boilers, discuss the advantages and disadvantages, including capital cost, in designing a horizontal retort house with waste-heat boilers instead of regenerators. State the number of pounds of steam that could be generated by waste gases per pound of fuel consumed in the producer, with and without regenerators, with the temperature and CO_2 content of the waste gases as indicated in your answer to the first part of this question; and state the temperature and CO_2 content of the waste gases at the outlet of the boiler. Give your calculation. What type of waste-heat boiler would you recommend? Give your reasons for its recommendation.

7. State the amount of fuel and oil consumed in a modern carburetted water gas set per 1000 c.ft. of carburetted water gas when producing a gas having a calorific value of 450 B.Th.U. State in pounds the amount of fuel, under boilers, required for the production of steam for generators, steam-driven blowers, circulating water, oil, and other ancillary pumps per 1000 c.ft. of carburetted water gas of the above quality. If a waste-heat boiler were added to a carburetted water gas plant, by what proportion would this fuel used be reduced? Describe, with sketch, a boiler generator having a rotary grate, and state the pounds of steam and pressure per 1000 c.ft. of 450 B.Th.U. gas that would be raised in such a boiler generator.

8. Power is being more generally applied in medium-sized works to take the place of manual labour. State what form of power you would recommend as a prime mover, and by which means you would apply it for coal and coke handling, and subsequently other manufacturing operations up to the gasholder. Give your reasons, and the efficiencies you would expect.

9. Explain, with accompanying sketch, the plant and method of washing coal gas for the production of crude spirit. What absorbent would you recommend? Describe the method of revivifying it in the vicinity of the washing plant. State how much crude spirit could be obtained per ton of coal carbonized, mentioning the type of coal used and carbonizing plant, and the effect on the calorific value of the coal gas, and likely effects on the distribution system, by the removal of such an amount of crude spirit. Describe the method of washing gas for the removal of naphthalene, and state the absorbent you would recommend, and how you could profitably dispose of this absorbent when saturated.

10. Give an outline sketch of a modern sulphate of ammonia plant, and describe the process of manufacture. Describe a method of making neutral dry sulphate of ammonia, stating the percentage of nitrogen a good neutral sulphate should contain; and the physical appearance of high-quality sulphate.

GAS SUPPLY.

ORDINARY GRADE.

From 2 to 5 p.m.

Sketches may be adopted to obviate long and involved statements. The general neatness of the papers, including that of the sketches, and also lucidity of expression, will be taken into consideration in assessing marks.

(Eight questions set; six only to be attempted.)

1. State what you know of the conditions that lead to the fracture of cast-iron mains laid under ground. Describe the means you would take to effect (1) a temporary repair and (2) a permanent repair of a 6-in. main fractured at a socket.

2. Make simple sectional sketches of service governors with (*a*)

mercury seal and (*b*) leather diaphragm, and give a clear description of how they work. Discuss their relative merits.

3. Explain, with sketches, the working of a wet type pressure recorder (the recording pen being attached to a float). Calculate the vertical movement of the pen corresponding to a change of pressure of 1-in. water-gauge from dimensions given on your sketches.

4. A service pipe supplying a block of flats has to be relaid from main to rising pipe. Enumerate, and describe with sketches, the pipe fittings and tools required for the work. Also give an account of how you would proceed, having regard to the safety and convenience of the consumers affected.

5. Make a sectional sketch of an outdoor cluster type of lamp. Show how it is made weather-proof. Why is it important that the mantles used on cluster lamps should be uniform in size?

6. What do you understand by the gross and net calorific values of a gas? To what is the difference between them due, and why is it that the heat units represented by the difference cannot always be applied usefully?

7. A consumer complains of a cooker giving an offensive odour. What would you suspect as the possible causes of this, and what would you do to rectify the various defects?

8. For what purposes are thermostats used in the utilization of gas? Describe, with sketches, one type with which you are familiar, and explain its operation.

Higher Grade.

Part I., from 2 to 5 p.m.

(*Six questions set; five only to be attempted.*)

1. Two places, A and B, at the same altitude, and 3000 yards apart, are connected by a 6-in. main. There are no branches from the main between A and B, and it is found that with a pressure of 6-in. water-gauge at A, and a flow of 6000 c.ft. per hour, the water-gauge pressure at B is 3·3 in. (Specific gravity of gas = 0·5.) (1) What would be the rate of flow with the same gauge readings and gas of the same specific gravity if B were 300 ft. lower than A? (2) Also, what would be the rate of flow if the specific gravity of the gas were changed to 0·4 in (1)? Specific gravity of water as compared with air to be taken as 800 in the calculation, and variations in the coefficient of friction ignored.

2. The stock of gas in a holder is reduced in the course of twelve hours from 4 million c.ft. to 1 million c.ft., no gas having been added during this time. The following conditions obtain at the beginning and end of the period respectively:

	At Beginning.	At End.
Atmospheric pressure	29·5 in.	30·5 in.
Temperature of gas in holder	50° Fahr.	55° Fahr.
Pressure thrown by holder	8 in. water	4 in. water

Calculate the volume of gas removed from the holder corrected to 60 and 30 wet.

Tension of aqueous vapour at 60° = 0·517 in. mercury
" " " " " 55° = 0·432 " "
" " " " " 50° = 0·360 " "

Why is it necessary to take into-account the tension of aqueous vapour?

3. Explain the distinctive features of radiant heat and convected heat. What proportion of these would you expect from (*a*) a gas fire and (*b*) a hot water radiator? What factors have to be taken into account in evaluating completely the hygienic conditions of the air of a room in a house or workshop?

4. A workshop having a floor area of 100 ft. by 40 ft. has to be lighted so that the average illumination at floor level is 2½ foot-candles. The distribution of the illumination must be such that the ratio of the highest to the lowest values is not greater than two. The tie rods of the roof trusses are 12 ft. above floor level. What hourly rate of gas consumption would you anticipate as necessary to provide the required illumination? What size and type of lamp would you employ, and what form of shade would you apply so as to conform with the recommendations of the Home Office Departmental Committee on Lighting in Factories and Workshops? What spacing and height would you allow? Sketch approximately the form of the polar distribution of candle power of the lamp you would recommend. Your answer should have regard to the need for economy in capital expenditure.

5. Make a sketch of a hot water installation for supplying a bath and five basins or sinks in a house of three storeys, ensuring (*a*) that the whole of the water heated can be drawn; (*b*) that hot water is available immediately at any of the taps; (*c*) that repairs to draw-off taps can be made without having first to empty-down the whole system; and (*d*) that the hot storage cannot be run dry if the cold water supply fails. Explain, by reference to your sketch, how each of these conditions is satisfied.

6. Make a careful sketch of an indicator diagram from a modern gas engine, and use it to describe the complete cycle of operations. Show how various faults in the valve setting and running of an engine can be detected from an examination of the indicator diagram.

Part II., from 6 to 9 p.m.

(*Six questions set; five only to be attempted.*)

7. Make sketches illustrating the complete flue equipment of (*a*) a gas fire fitted to a chimney having only a sluggish natural draught and (*b*) a geyser which has to be ventilated through a wall into the open air. State on the sketch the purpose of each of the parts, and describe fully what you know of the physics and chemistry underlying their working and their bearing upon proper combustion.

8. From an impartial standpoint review the relative merits and demerits of gas and electric lighting in the various circumstances that prevail in practice. What, in your view, are the best means of combating electrical competition, having regard to (*a*) domestic lighting, (*b*) shop lighting, and (*c*) factory lighting?

9. A sample of the flue gases in a chimney into which a gas fire discharges its products of combustion is found on analysis to contain 0·3 p.ct. by volume of CO_2. The original gas is known to have the following constitution:

	P.Ct.
CO_2	2·65
$O_{2\cdot56}H_{5\cdot12}$	2·38
C_6H_6	*Nil*
O_2	0·78
CO	12·67
H_2	46·59
CH_4	25·09
N_2	9·84
	100·00

Supposing the fire consumes 35 c.ft. per hour, what volume of air per hour is being drawn from the room into the chimney?

10. A gas undertaking has decided to make periodic maintenance inspections of gas fires on the district which have hitherto only received attention following complaints from consumers. Give, in the order of their relative importance, the instructions you would give to the fitters who will be called upon to do the work, and describe the tools and materials they would carry with them.

11. State the number of B.Th.U. required to produce 1000 candle-power-hours with (*a*) ordinary low-pressure burners, (*b*) low-pressure cluster burners, and (*c*) high-pressure inverted lamps. State fully what you know of the physical reasons for the different efficiencies of the three systems.

12. Make a sketch (approximately to scale) showing the materials used in, and the constructional details of, a modern gas-fired crucible furnace. Also prepare a statement showing the daily working of such a furnace under any conditions with which you are familiar, giving times and gas consumptions for the first and subsequent heats. Summarize the chief points to which you would give attention in order to maintain the best working results.

NOTTINGHAM GAS UNDERTAKING.

A Profit of £122,017.

The accounts of the Nottingham Corporation Gas Department for the year ended March 31 last show a gross profit of £122,017, which compares with £88,545 in the previous twelve months. The rates benefit to the extent of £30,000, this being £5000 more than in 1925.

The Gas Committee's report (which was signed by Sir Albert Ball, as Chairman) states that the income for the year on revenue account amounted to £639,233, and the expenditure to £517,217. The available balance is £80,764; leaving £50,764 to be carried forward, after deducting the allocation to the rates. In the early part of the financial year the Committee were able to arrange new contracts for coal which resulted in an average price of 20s. 6·53d. per ton, as compared with 24s. 1·33d. per ton for the previous year. The receipts for coke were £26,635 less. The market for tar products was also depressed during the earlier part of the year, but prices improved later on. Favourable contracts were then made which, combined with an improved yield of tar in consequence of the whole of the vertical retorts being in operation, resulted in net receipts amounting to £41,851, as compared with £42,320 for the previous year. Synthetic nitrogen compounds are being put on the market in increasing quantities, and the price of sulphate of ammonia had to be reduced to meet the position from time to time. The receipts for this product therefore decreased by £4620.

The Committee recommend the following reduced scale of charges, as from the reading of the meters at March last:

	Pence Per Therm.
For Lighting and Domestic Cooking and Heating:	
If the consumption be under 120 therms per quarter	7·9
If 120 therms and under 240 therms per quarter	7·7
If 240 therms and under 480 therms per quarter	7·5
If 480 therms and under 960 therms per quarter	7·1
If 960 therms and upwards per quarter	6·9
For all Industrial Purposes other than Power:	
At the same rate as for lighting and domestic cooking and heating, less 10 p.ct. special discount if paid within 14 days from delivery of the account.	
For Power Purposes:	
If the consumption be under 475 therms per quarter	6·5
If 475 therms and under 950 therms per quarter	6·3
If 950 therms and under 1425 therms per quarter	6·1
If 1425 therms and over per quarter	5·9
Prepayment Meters:	
The charge for gas supplied through prepayment meters is at the rate of 1d. for every 20 c.ft. consumed, less one-halfpenny in the shilling rebate . . . . Net,	10·09
In the outlying districts of Stoke Bardolph, Burton Joyce, Linby, Selston and Underwood, and Cotgrave, the charge is 1·26d. per therm in excess of the respective charges set out in the above scale.	

The scale represents a reduction of 0·4d. per therm (practically 2d. per 1000 c.ft.), or approximately £22,000 per annum.

It may be, the Committee state, that under the proposed reconstruction of the coal industry some scheme will evolve under which it will be possible to obtain a supply of gas from carbonizing plant erected in the neighbourhood of Nottingham; but it is to be regretted that the scheme proposed by certain local collieries a year or two ago had not come to fruition, and the contract which the Committee had entered into for a supply of gas has now been definitely cancelled.

The quantity of gas sold during the year was 2,699,267,000 c.ft. (12,821,518 therms), compared with 2,571,307,200 c.ft. (12,213,709 therms) in the previous year—an increase of 127,959,800 c.ft. (607,809 therms), or 4·98 p.ct. The quantity of gas sold per ton of coal carbonized was 12,909 c.ft. (61·3 therms), as compared with 12,704 c.ft. (60·3 therms). The following figures show the difference between present-day and pre-war costs.

Year Ended.	Gas Sold (C.Ft.)	Total Expenditure. £
March 31, 1926 . .	2,699,267,000	.. 517,217
March 31, 1914 . .	2,251,302,700	.. 250,995
Increase . .	447,964,300	.. 266,222

The expenditure per million c.ft. of gas sold has therefore increased from £111 9s. 9d. for the year ended March 31, 1914, to £191 12s. 3d. for the year ended March 31 last—an increase of 72 p.ct. The following are the comparable receipts for gas per 1000 c.ft. sold for the same periods:

	s. d.
March 31, 1926	3 5·32
March 31, 1914	2 5·17
Increase	1 0·15, or 41·65 p.ct.

MR. JOHN WILKINSON'S REPORT.

Mr. John Wilkinson, as Engineer and Manager, presents his 15th annual report, in which he states that during the period under review 198,518 tons of coal and 281,330 gallons of oil were utilized in course of manufacturing the following: Coal gas, 2,680,868,000 c.ft., or 12,741,939 therms; water gas, 142,978,000 c.ft., or 682,350 therms—total, 2,823,846,000 c.ft., or 13,424,289 therms. Coke for sale, 94,878 tons; tar, 12,397 tons; and ammoniacal liquor (10-oz. strength), 32,888 tons. The water gas equalled 5·06 p.ct. of the total gas made.

The total length of mains laid at March 31 was 445·21 miles; and during the year 2981 new gas services were connected to the mains, against 2292 in the previous year. The number of meters fixed at March 31 (including 462 lamp meters) was 96,027; being an increase of 2526 on the previous year. The average consumption per meter (exclusive of lamp meters) equalled 26,346 c.ft. (125·1 therms), as compared with 25,837 c.ft. (122·7 therms) the year before. According to official records, there were in use at March 31 50,302 gas cooking stoves and 24,475 gas fires. These figures do not include a number of cookers, fires, &c., which have been purchased privately by the consumers. The number of public gas lamps erected within the area of supply at March 31 was 8686.

Alderman Sir ALBERT BALL, in characteristically terse terms, moved the adoption of the report at the last meeting of the Council.

Mr. ASHWORTH referred to the facts that £30,000 was to be confiscated in relief of rates from the profits of the undertaking, and that there was to be a reduction in the price of gas of 2d. per 1000 c.ft. He suggested, however, that the reduction to be conceded should be 6d., which would represent a total of approximately £66,000, still leaving a substantial balance to be carried forward to the reserve. The Nottingham Gas Committee had £450,000 invested in Government and Corporation stocks; and there was no undertaking of the kind throughout the country which was better circumstanced financially.

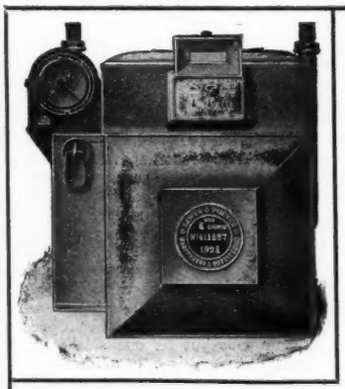
Alderman FORD took exception to the use of the term "confiscated" by Mr. Ashworth in his reference to the amount to be applied from the profits in relief of rates. Mr. Ashworth was himself a member of the Gas Committee which voted that amount.

Mr. ASHWORTH: But I criticized the vote at the time.

Alderman BOWLES said it was gratifying to know that with the passing of time a feeling of caution had been brought to the mind of the Chairman of the Gas Committee; but he was still distributing to ratepayers who were non-consumers of gas the handsome amount of £30,000, whilst those who were still unfortunate enough to have to use gas were having to pay an inordinately high price for it. He suggested that, instead of the Committee holding these large reserves, it would be much better in the interest of consumers to give greater consideration to the question of the reduction of the price of gas.

Alderman Sir A. BALL, in replying, said that the gas undertaking had experienced an exceedingly good year; and a great deal of the credit for this was due to the Manager and his staff, and everyone concerned, who had worked loyally to promote the success of the undertaking. In Mr. Wilkinson they possessed a Manager who was second to none in England, and who was recognized by his fellow engineers as being one of the best men in the profession. Mr. Ashworth had declared that they were "confiscating" £30,000 of the profits; and if so, it was because they desired that Mr. Ashworth and other residents in outlying districts should contribute their share towards the undertaking. If they compared the report with that relative to similar undertakings throughout the country, they would be satisfied that Nottingham had every reason to be proud of its position.

The report was adopted.



The "Victory"

Nelson Meter Works,
MANCHESTER.

Radford Meter Works,
NOTTINGHAM.

45/47, Westminster Bridge Rd.,
LONDON, S.E. 1.

SAWER & PURVES
BRANCH OF METERS LTD.

TELEPHONE NOS.
3289 (City) Manchester.
2025 Nottingham.
2412 (Hop) London.

TELEGRAMS
"Sawer Manchester."
"Sawer Nottingham."
"Metrique Lamb, London."

GAS REGULATION ACT ORDER.

We have received from the Director of Gas Administration copies of the following Order made under section 1 of the Gas Regulation Act.

Widnes Corporation.

After the declared date, and subject to the provisions of Article XI. (Local Acts and Orders) of the Widnes (Extension) Order, 1920, the price of 12d. per therm shall be substituted for the price of 5s. per 1000 c.ft. mentioned in section 57 (limiting price of gas) of the Widnes Improvement Act, 1867; and the price of 14·4d. per therm shall be substituted for the price of 6s. per 1000 c.ft. mentioned in section 23 (as to charges for gas and water) of the Widnes Local Board Act, 1875. (May 12.)

GAS REGULATION ACT APPLICATION.

SPECIAL ORDER.

Hoddesdon Gas and Coke Company, Ltd.

To extend the limits within which the Company are authorized to supply gas; to authorize the Company and the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company to carry out arrangements for the supply of gas by the Company in the parish of Nazeing (which is within the limits of the Bishop's Stortford Company); to empower the Company to raise additional capital; to authorize co-partnership or profit sharing; and for other purposes.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

Report sent for publication on May 12.

Trade is immobilized except such small retail sales as are permitted under the control. Though industry was by no means paralyzed during the first week of the strike, those branches which consume the biggest quantities of raw fuel were closed down for the most part. In exceptional cases blast-furnaces were kept in active operation. More generally, however, smelters damped down at the outset. This was in accordance with their pre-declared policy. They had not taken the chance of accumulating coke against the emergency. There was a pretty general suspension of work at forges and foundries. In rare instances rolling mills were kept going.

Many of the metal working and other trades which take their power from electric supply and gas undertakings kept their plants running for a time, in spite of the gradually tightening pressure of the unions. The call-out of the Amalgamated Engineering Unions had the effect of demonstrating the extent to which artisans have freed themselves from the domination of the machine. Many important plants were maintained in activity notwithstanding the withdrawal of the union men. The official control of coal had little meaning except for the domestic consumer. The trade lent its aid to the authorities, though it is widely felt that the principles on which control is applied are not only unjust to merchants, who are expected to take risks of loss without reasonable hope of gain, but are calculated to defeat the object of strengthening reserves and making the most economical use of them.

For publication on May 19.

The stringent regulations laid down for conservation of fuel stocks necessarily have the effect of retarding the industrial resumption now that the unions have abandoned their attempt to put a stranglehold on trade. Those manufacturers, who, depending on raw fuel, were enterprising enough to accumulate reserves, have to restrict their activities in spite of all precautions. This is felt to be a hardship in cases where there is a demand for commodities, and where measures have been taken to circumvent shortcomings of transport. Generally speaking, however, trade dislocation is so widespread that without official control the industrial consumption of fuel would have been automatically restricted.

In the iron and steel trade productive activity was not brought to an end by the cutting-off of supplies from the coalfields. In very exceptional cases blast-furnaces were kept blowing, though nearly all those which had been in commission were damped down in the first two weeks of the struggle. Forges were stopped, as were the great majority of the mills. Here and there re-rollers kept plants running, and some sections of the tube trade were determined not to give in without a strong effort. The raw material market was brought practically to a standstill when the miners struck. Neither buyers nor sellers would take speculative risks on an issue which defied calculation.

At the public power supply stations the material resources which had been mobilized were reinforced by a rally of volunteer labour against contingencies, so that in most centres the maintenance of those services was amply ensured.

Protection of a Trench.

In the King's Bench Division, on Tuesday, Mr. Justice Shearman and a common jury heard an action in which Arthur Norton, a night watchman, claimed damages from the Gas Light and Coke Company for injuries sustained by him in falling into a trench dug by the defendants for the purpose of laying a gas supply to some new buildings in Dalston Lane, London, on March 3 last year. Norton was employed by the builders, and his case was that the trench ought to have been covered, or that some kind of protection should have been afforded. After evidence had been given, the jury found that defendants had taken reasonable care; and judgment was thereupon entered for them with costs.

CURRENT SALES OF GAS PRODUCTS

The London Market for Tar, Tar Products, and Sulphate.

London, *May* 17.

In the London tar products market, business in pitch for the current season is practically at an end, and the value of the material is nominal at about 80s. per ton f.o.b. makers' works.

Creosote is steady and firm at 7½d. per gallon net and naked.

All tar spirits are firm, pure benzole and pure toluole being 2s. 2d. to 2s. 3d. per gallon, and 95/160 solvent naphtha 1s. 10½d. to 1s. 11d.

Pyridine is quiet at 17s. to 18s. per gallon.

Tar Products in the Provinces.

Report sent for publication on May 12.

May 10.

Business is practically at a standstill owing to the general strike, and prices remain nominally unchanged.

The average values for gas-works products during the week were: Gas-works tar, 46s. to 51s. Pitch, East Coast, 67s. 6d. to 70s. f.o.b. West Coast—Manchester, 61s. to 63s. 6d.; Liverpool, 62s. 6d. to 65s.; Clyde, 67s. 6d. to 70s. 6d. Benzole, 90 p.ct. North, 1s. 8½d. to 1s. 9½d.; crude, 65 p.ct. at 120° C., 1s. 1d. to 1s. 2d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 8½d. to 1s. 9½d. Toluole, naked, North, 1s. 8d. to 1s. 9d. nominal. Coal-tar crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 11½d. to 1s. 0½d. Creosote, in bulk, North, liquid, 6½d. to 6¾d.; salty, 5¾d. to 6d.; Scotland, 5⅝d. to 5¾d. Heavy oils, in bulk, North, 6¾d. to 7d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Report sent for publication this week.

May 17.

There is practically no alteration in the position and prices remain nominally unchanged, as above.

CONTRACTS OPEN.

Coal.

The Gas Committee of the Mansfield Corporation are inviting tenders for screened gas coal or cobbles. [See advert. on p. 353.]

TRADE NOTES.

Plant at Sydenham Gas-Works.

Messrs. Ashmore, Benson, Pease, & Co., Ltd., of Stockton-on-Tees, have been favoured with an order from the South Suburban Gas Company (Mr. John Terrace, Chief Engineer) for the supply and erection of three Livesey washers, 15 ft. by 7 ft. 6 in., with 18 in. and 24 in. connections, for the Lower Sydenham Gas-Works.

Co-Partnership at Lea Bridge.

In a foreword to the accounts for the year 1925 of the Lea Bridge District Gas Company Co-Partnership, "F. W. C." says: The worker is worthy of his hire, and the employer, whether he be an individual or a company, is worthy of his profit; and if we can solve the indefinite relationship between these two elements, we shall solve many of our industrial troubles. Co-partnership appears to offer the nearest solution to this problem; but it must be combined with a mutual trust and confidence between worker and employer. On the one hand, the employer is entitled to the best service the worker can give, and the worker is entitled to a share of any extra profit which may arise in the business with which he is directly concerned. Out of this will arise true co-partnership, and by means of this co-partnership the worker will be first assured of his minimum or subsistence wage according to grade; and while the employer is making a profit, either more or less, a certain percentage is put on one side for the ultimate benefit of the worker. This, however, is only a foundation, but a very solid and substantial foundation, and from it may arise many other direct and indirect benefits, the which can now be plainly observed by the co-partners and workers of the Lea Bridge Gas Company.

Nation's Health Exhibition at Leicester.—Owing to the strike, it has been decided to postpone for a fortnight the Nation's Health Exhibition at Leicester—*i.e.*, until May 26. This is a provisional arrangement.

The North-Western Co-Operative Tar Distillers, Ltd., is the title of a newly-registered private Company, with a nominal capital of £50,000, in £1 shares, to carry on business as manufacturers of, and dealers in, coke, coal tar, pitch, ammoniacal liquor, &c.

British Industries Fair, Birmingham (1927).—Prospectuses are now available of the British Industries Fair, to be held in the Exhibition Buildings at Castle Bromwich, Birmingham, from Feb. 21 to March 4, 1927. Charges for space will be the same as this year. The General Manager is Mr. Charles Stanley, of 95, New Street, Birmingham.

Co-Partnership at Chester.—The Co-Partnership Committee of the Chester United Gas Company report that during 1925 the Directors have allocated £1402 to the co-partnership fund. This amount allows of the distribution of a bonus at the rate of 6¼ p.ct. on the salaries and wages of co-partner employees. During the year employees have purchased £1090 ordinary stock. The membership has increased from 129 to 135, of whom 87 are stockholders, as compared with 54 in the previous year.

STOCK MARKET REPORT.

Owing to the dislocation in printing caused by the General Strike, our Stock Market Correspondent informs us that there was a lapse in the issue of the Stock Exchange Lists until yesterday morning. The table has been corrected up to that time to show the changes in prices which have recently occurred ; but, in the circumstances, he considers it would be useless this week to make any comments upon the situation of gas stocks and shares in the market.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. May 14.	Rise or Fall since April 30.	Transactions Lowest and Highest Prices.
£			%p.a.	% p.a.				
171,978	Stk.	Feb. 4	5	5	Aldershot 5 p.c. max. C. .	74—77	..	..
322,992	,,	,,	4	4	Do. 4 p.c. Pref. . .	69—74	..	..
1,551,868	,,	Apl. 1	6½	6½	Alliance & Dublin Ord. .	72—75	+2	..
374,000	,,	Jan. 7	4	4	Do. 4 p.c. Deb. . .	60—65	..	..
300,000	1	May 6	1/7½	1/7½	Bombay, Ltd.	7/8—1*	−1/16	..
170,000	10	Mar. 4	8½	8½	Bournemouth 5 p.c. . . .	12—13	..	..
425,050	10	,,	7	7	Do. B 7 p.c. . .	12—12½	..	..
275,000	10	,,	6	6	Do. Pref. 6 p.c. .	11—12	..	..
50,000	Stk.	Jan. 7	3	3	Do. 3 p.c. Deb. .	55—58	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb. .	75—78	..	..
214,740	,,	Mar. 18	12	12	Brighton & Hove Orig. . .	167—172	..	..
244,200	,,	,,	9	9	Do. A Ord. .	130—135	..	..
1,387,500	,,	Feb. 18	5	5	Bristol 5 p.c. max. . . .	85—86a	..	..
855,000	,,	Mar. 18	8	7	British Ord.	98—103	−2	..
100,000	,,	Jan. 7	7	7	Do. 7 p.c. Pref. . . .	117—122	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. .	69—74	..	..
100,000	10	Dec. 17	8	6	Cape Town, Ltd. . . .	6½—7½	..	..
100,000	10	Apl. 22	4½	4½	Do. 4½ p.c. Pref. . .	5¾—6½	..	..
150,000	Stk.	Jan. 7	4½	4½	Do. 4½ p.c. Deb. . .	68—73	..	..
626,860	,,	Feb. 18	6	6	Cardiff Con. Ord.	96—99	..	..
237,860	,,	Jan. 7	7½	7½	Do. 7½ p.c. Red. Deb. .	98—101	..	..
157,150	,,	Mar. 4	5	6½	Chester 5 p.c. Ord. . . .	87½—92½b	..	..
79,185	1	Apl. 22	+2/-	+2/-	Colombo Ltd. Ord. . . .	28/—30/-	..	..
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. .	20/—22/-	..	..
1,513,280	Stk.	Mar. 4	5½	5½	Commercial 4 p.c. Cap. .	77—82	..	..
560,000	,,	,,	5/3/4	5/3/4	Do. 3½ p.c. Cap. .	76—81	..	..
475,000	,,	Dec. 17	3	3	Do. 3 p.c. Deb. .	55—58	..	..
800,000	,,	Oct. 8	—	4	Continental Union, Ltd. .	32—37	..	..
200,000	,,	Mar. 4	7	7	Do. 7 p.c. Pref. .	85—88	..	..
737,150	,,	Mar. 4	6½	6½	Croydon sliding scale . .	95—98	..	..
403,100	,,	,,	5	5	Do. max. div. . . .	79—82	..	..
492,270	,,	Mar. 4	6	9	Derby Con.	107—109c	..	..
55,000	,,	Dec. 17	4	4	Do. Deb.	74—76c	..	..
209,000	,,	Mar. 4	5	5	East Hull Ord. 5 p.c. . .	86—89	..	..
50,000	,,	Dec. 17	—	5	Eastbourne 5 p.c. Deb. .	93—98	..	..
1,002,180	10	Apl. 1	+6	+4	European, Ltd.	5—6	..	..
18,788,960	Stk.	Feb. 18	5½	4/17/4	Gas Light & Coke 4 p.c. Ord.	77—80	−2	..
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max. . . .	58—61	..	..
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref. .	72—76	−1½	..
5,602,620	,,	Dec. 17	3	3	Do. 3 p.c. Con. Deb. .	57—60	..	..
181,315	,,	—	—	—	Do. 6 p.c. Br'tf'd Rd. Db.	102—104	..	..
130,000	,,	—	10	10	Do. 10 p.c. Bonds. . .	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb. .	..	..	..
82,500	,,	Mar. 18	6½	6½	Hastings & St L. 5 p.c. Conv	88—93	..	..
258,740	,,	,,	6½	6½	Do. 3½ p.c. Conv.	68—73	..	..
70,000	10	Sept. 24	†10	†10	Hongkong & China, Ltd. .	20—21	..	..
173,200	Stk.	Mar. 4	10	10	Hornsey Con. 3½ p.c. . .	66—68	..	..
1,976,000	,,	Nov. 19	59	10	Imperial Continental Cap.	137—142	..	..
226,170	,,	Feb. 4	3½	3½	Do. 3½ p.c. Red. Deb.	69—72	..	..
235,242	,,	Mar. 18	6½	6½	Lea Bridge 5 p.c. Ord. . .	95—100	..	..
2,127,340	,,	Feb. 18	5½	5½	Liverpool 5 p.c. Ord. . .	79—80b	..	..
600,000	,,	Mar. 18	7	7	Do. 7 p.c. Red. Pref.	101½—103½b	..	..
165,736	,,	Feb. 18	9	8	Maidstone 5 p.c. Cap. . .	115—120	..	..
63,480	,,	Dec. 17	3	3	Do. 3 p.c. Deb. . .	54—59	..	..
75,000	5	Dec. 3	†7	†6	Malta & Mediterranean .	4½—5	..	..
541,920	Stk.	Nov. 19	†4	†4	Montevideo, Ltd.	75—79	..	..
2,061,315	,,	Mar. 4	5	5	Newcastle & Gateshead Con.	71½—72d	..	..
360,929	,,	,,	4	4	Do. 4 p.c. Pref. .	75—76d	..	..
529,705	,,	Dec. 17	9½	8½	Do. 8½ p.c. Deb. .	71—73d	..	..
15,000	,,	Mar. 4	11½	11½	North Middlesex 10 p.c. .	155—160	..	..
91,530	,,	,,	8 5/20	8 5/20	Do. 7 p.c. .	112—117	..	..
300,000	Stk.	May 6	9	7	Oriental, Ltd.	95—100*	−3	..
188,120	,,	Jan. 7	7⅞	7⅞	Plym'th & Ston'house 5 p.c.	110—115	..	..
60,000	50	Mar. 4	14	14	Portsea Island B . . .	90—95	..	..
100,000	50	,,	13	13	Do. C . . .	88—93	..	..
2,289,909	1	—	—	—	Primitiva Ord.	10/6—11/6	−/3	..
302,600	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	84—86	..	..
600,000	Stk.	Jan. 21	4	4	Do. 4 p.c. Red. Deb. 1911	66—68	..	..
193,744	,,	Dec. 17	4	4	Do. B. Aires 4 p.c. Rd. Db.	66—68	..	..
264,496	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	66—68	..	..
150,000	10	Mar. 18	6	6	San Paulo 6 p.c. Pref. . .	7⅞—8	..	..
125,000	50	Jan. 4	5	5	Do. 5 p.c. Red. Deb.	43—46	..	..
270,000	Stk.	Mar. 18	5½	6	Sheffield A	98—100e*	..	..
419,968	,,	,,	5½	6	Do. B	98—100e*	..	..
1,047,000	,,	,,	5½	6	Do. C	98—100e*	..	..
90,000	10	June 11	6	4	South African	5—7	..	..
6,609,895	Stk.	Mar. 4	5	7	South Met. Ord.	91—93	..	..
1,895,445	,,	Jan. 7	3	3	Do. 3 p.c. Deb. . .	56—59	..	..
734,000	,,	Mar. 4	6½	6½	Do. 6½ p.c. Red. Db.	102—104	..	..
91,500	,,	Mar. 4	8½	8½	South Shields Con. . . .	117—119d	..	..
1,187,795	,,	Mar. 4	6½	6½	South Suburban Ord. 5 p.c.	97—100	..	..
368,837	,,	Dec. 17	5	5	Do. 5 p.c. Deb.	94 - 97	..	..
647,740	,,	Mar. 18	5	5	South'mpton Ord. 5 p.c.max	77—80	..	..
121,275	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	69 - 74	..	..
250,000	,,	Mar. 4	7	7	Swansea 7 p.c. Red. Pref. .	99—102	−½	..
200,000	,,	Dec. 17	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
120,000	,,	Feb. 18	7½	7½	Tottenham District A 5 p.c.	107—112	..	..
882,275	,,	,,	5½	5½	Do. B 3½ p.c.	87—90	..	..
150,000	,,	,,	28/4	5½	Do. 5½ p.c. Pref.	101—103	..	..
181,255	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	74—77	..	..
258,251	,,	Mar. 18	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, & Wycombe 5 p.c. . . .	67 - 68d	..	..
197,294	,,	Mar. 4	6⅝	6⅝		90—95	..	..
88,330	,,	,,	5	5	Do. 5 p.c. pref. .	85—90	..	..
91,800	,,	,,	6⅝	6⅝	Do. 5 p.c. Maidenh'd	87—92	..	..
30,000	,,	Mar. 4	8½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c. .	123—128	..	..
255,696	,,	,,	7	7	Do. B 3½ p.c. .	103—108	..	..
412,450	,,	,,	5/19/0	5/19/0	Do. C and New	88—93	..	..
352,000	,,	,,	6⅝	6⅝	Wimbledon 5 p.c. . . .	97—102	..	..
98,000	,,	,,	7⅛	7⅛	Epsom 5 p.c.	105—110	..	..
88,416	,,	Jan. 7	3	3	3 p.c. Deb.	55—58	..	..

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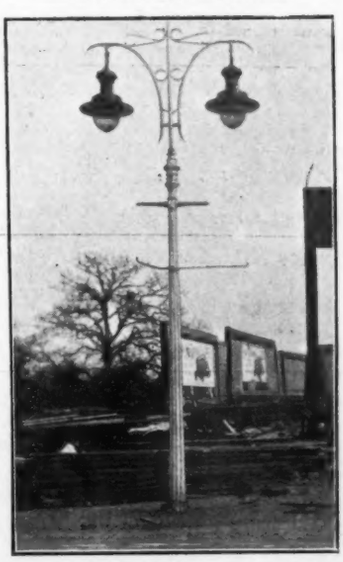

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